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LABORATORY ECOSYSTEMS FOR STUDYING CHEMICAL FATE:
An Evaluation Using Methyl Parathion

by

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16. ABSTRACT

The use of complex microcosms as tools for testing mathematical models of pollutant fate was evaluated by determining the transport and transformation of methyl parathion in two-8-compartment, continuous flow microcosms designed to enhance the effects of different degradation processes. Objectives were to develop different chemical and biological environments by adding inorganic nutrients, glycerol, contrived sediments, and natural sediments sequentially to compartments down the length of the channel; to determine whether the microcosms established stable states during the experimental periods; and to determine whether the fate of methyl parathion was related to environmental characteristics of each compartment.

Observed differences in chemical treatments were reflected by differences in community structure and community function. Statistical comparisons of bacterial and total microbial biomass revealed significant differences; compartments with organic and inorganic nutrient additions were generally grouped separately from those with only inorganic nutrient additions. Relative rates of diurnal dissolved oxygen change were also significantly different between those compartments with different nutrient additions. Inclusion of natural and contrived sediments had few significant effects on the structure or function of the water or aufwuchs communities.

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FOREWORD

Environmental protection efforts are increasingly directed towards preventing adverse health and ecological effects associated with specific compounds of natural or human origin. As part of this Laboratory's research on the occurrence, movement, transformation, impact, and control of environmental contaminants, the Environmental Systems Branch studies complexes of environmental processes that control the transport, transformation, degradation, and impact of pollutants or other materials in soil and water and assesses environmental factors that affect water quality.

Concern about environmental exposure to toxic substances has increased the need for accurate information on the transport, fate, and effects of trace contaminants in natural waters. Mathematical models, such as the EXposure Analysis Modeling System developed at this Laboratory, can be used to predict the behavior of chemicals before they are introduced to aquatic systems during manufacture, use, and disposal. An important phase in the development of these models is careful testing to assure that accurate data are produced. This report evaluates the use of complex microcosms as tools for testing exposure models.

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ABSTRACT

The use of complex microcosms as tools for testing mathematical models of pollutant fate was evaluated by determining the transport and transformation of methyl parathion in two 8-compartment, continuous flow microcosms designed to enhance the effects of different degradation processes. Objectives were to develop different chemical and biological environments by adding inorganic nutrients, glycerol, contrived sediments, and natural sediments sequentially to compartments down the length of the channel; to determine whether the microcosms established stable states during the experimental periods; and to determine whether the fate of methyl parathion was related to environmental characteristics of each compartment.

Observed differences in chemical treatments were reflected by differences in community structure and community function. Statistical comparisons of bacterial and total microbial biomass revealed significant differences ($\alpha = 0.05$); compartments with organic and inorganic nutrient additions were generally grouped separately from those with only inorganic nutrient additions. Relative rates of diurnal dissolved oxygen change were also significantly different between those compartments with different nutrient additions. Inclusion of natural and contrived sediments had few significant effects on the structure or function of the water or aufwuchs communities. Stable state, with respect to critical nutrient concentrations and relative estimates of community metabolism, was generally established in each compartment from the date of methyl parathion introduction into the laboratory ecosystems. The downstream compartments generally achieved stable chemical states later during the experimental period than the compartments nearer the influent.

The consistent increase in percentage loss of methyl parathion in the water column in each successive compartment was apparently related to the different nutrient treatments. There was no pattern in methyl parathion disappearance in the aufwuchs during the first experiment; however, there was an apparent relationship between methyl parathion loss and bacterial biomass in the aufwuchs during the second experiment. No methyl parathion was detected in the natural or contrived sediments. Results of subsidiary studies with aufwuchs communities to examine second-order transformation rates of methyl parathion demonstrated wider variation in the rate coefficients than previously reported results with suspended communities.

This report covers a period from October 1, 1978, to September 30, 1979, and work was completed as of September 30, 1980.

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SECTION 1

INTRODUCTION

EPA is developing an EXposure Analysis Modeling System (EXAMS) to be used as a tool for predicting the fate of individual chemical compounds in natural waters (Lassiter et al., 1978; Baughman and Burns, 1979). EXAMS, a theoretical-type model, uses specific process rate coefficients, loads, and environmental characteristics to calculate predicted concentrations of the toxicants. The use of laboratory-generated rate coefficients for parameterizing EXAMS will allow exposure analyses to be made as part of an environmental risk assessment prior to the manufacture, use, or disposal of a chemical.

To confidently use EXAMS for assessment and regulatory purposes, the model must be rigorously tested. Several factors must be considered when conducting the tests:

o The model predicts steady state levels of the toxicant, assuming that most environments will be in a stable state. The tests, therefore, should be completed in environments where ecological change is minimal or controlled. Laboratory studies show that static microcosms reach a stable state within 7 weeks (Giddings and Eddlemon, 1977).

o A valid test of the structure of the model must be completed without environmental fluctuations confounding the test. This can best be completed in microcosms where water chemistry and physical parameters are controlled.

o The tests should be completed in environments containing naturally selected biota. Use of the model is predicated on the assumption that physical-chemical parameters control the development of communities in predictable ways. Samsel and Parker (1972) used microcosms to show that physical-chemical parameters influence productivity more than do the taxonomic composition of inocula.

o The model should be tested with a toxicant that, at low concentrations, has no significant effects on the microbial community, that undergoes degradation by one or more processes within the residence time of the test facility, and that is readily measured in water, sediment, and biota. Methyl parathion was selected as the toxicant satisfying these criteria (Smith et al., 1978).

The USEPA's two-channeled microcosms were used to test the model. This facility allows testing under controlled conditions while maintaining a complex self-perpetuating biological community within each compartment. Each of the eight systems within the channeled microcosms was designed either to provide a test of a specific process being modeled or to enhance the likelihood that an important process not included in the model would be recognized.

Specific objectives of the testing phase were (1) to determine the fate of methyl parathion in complex aquatic microcosm communities, (2) to demonstrate that a period of steady state was established at the time of methyl parathion introduction and continued through the experimental period, (3) to determine whether chemically distinct environments were established in each system, and (4) to evaluate the effects of environmental changes on community composition and ecosystem function. These objectives were addressed by completing extensive analyses of water, aufwuchs, and sediment in two long-term studies; the first experiment was initiated in December, 1978, and was terminated in May, 1979, while the second experiment was performed from June to September, 1979.

SECTION 2

CONCLUSIONS

1. Stable aquatic systems were established and maintained in the two 8-compartment continuous-flow microcosms. Nonsignificant differences ($\alpha = 0.10$) in the mean values of the nutrient concentrations in each system (called continuously stirred tank reactors - CSTRs) indicated that each had achieved a stable state during both experimental periods.

2. Chemically distinct environments were established in various CSTRs, generally grouping CSTRs 3 and 4 together and CSTRs 5 through 8 together.

3. In general, chemical additions affected both community structure and community function in the aufwuchs but not in the suspended communities. Significant differences ($\alpha = 0.05$) were observed for bacterial biomass, ATP, and ash-free dry weight in the aufwuchs between upstream compartments as compared to downstream compartments. Relative estimates of community metabolism, as diurnal dissolved oxygen flux, also were significantly different between upstream and downstream compartments.

4. The microcosms functioned as complex microbial communities during these studies. Complexity was indicated by the presence of more than 30 algal taxa, 40 zooplankton genera, and several bacterial functional groups.

5. Generally, inclusion of artificial and natural sediments in several microcosm compartments had no significant impact on suspended and aufwuchs community development or ecosystem function. The sediments were covered with a thick aufwuchs community that probably minimized the importance of the sediment-water column interface in these ecosystems. The small surface area to volume ratio of sediments to the overlaying water may have also eliminated any measurable effects of the sediment community on total microcosm development.

6. Although disappearance of methyl parathion from the aufwuchs during the initial study appeared to be independent of total biomass or community composition, there was an apparent relationship between methyl parathion disappearance and bacterial biomass in the aufwuchs during the second experiment.

7. Although first-order degradation rates of methyl parathion were fairly constant, second-order rates of methyl parathion degradation varied by approximately two orders of magnitude during the two studies. This wide fluctuation appeared to be related to variation of total bacterial numbers; however, variation in the second order rates may have also been due to changes in the percentage of active degraders in the microbial community.

SECTION 3

RECOMMENDATIONS

1. Naturally derived microcosms that include distinctive microbial communities should be developed to enable more extensive testing of theoretical models for predicting the fate of toxic compounds in aquatic systems.

2. Laboratory microcosms that have achieved steady-state conditions based upon physical-chemical parameters should be utilized when examining the fate of toxic compounds.

3. The two 8-compartment laboratory microcosms should be divided into four 4-compartment microcosms to enable the development of replicate control and treatment microcosms.

4. Experimental design should incorporate sampling regimes that enable estimation of various sampling errors.

5. More emphasis should be placed on characterization of ecosystem functions for estimation of the fate and effects of toxic compounds in aquatic environments.

6. Extensive research on microbial transformation kinetics should be initiated so as to incorporate second-order transformation rate coefficients into theoretical models for predicting the fate of toxic compounds.

SECTION 4

FACILITY

INTRODUCTION

The studies were completed in the Athens Environmental Research Laboratory's channel microcosm facility. The facility is a controlled environment chamber measuring 22 m in length, 3.7 m in width, and 3.0 m in height, housing a flume that is 19.5 m long, 46 cm wide, and 51 cm deep with a "U" cross section. The flume is divided into two channels (A and B), each subdivided into eight 250-liter compartments (designated as continuously stirred tank reactors, CSTRs) equipped with an outlet weirs and paddlewheels. The mean surface area of each CSTR is 18,930.4 ($\pm$ 154.9) cm^2, and the surface area of each set of paddlewheels is estimated at 11,480 cm^2. The Plexiglas channel is lined with adhesive-backed 4 mil Teflon film. Turbulent mass transport in the CSTRs is induced by longitudinally supported paddlewheels that are adjusted to desired mixing rates. The effluent from an upstream compartment passing through a weir constitutes the influent for the next downstream compartment.

Bottom sediments contained in stainless steel trays are added to selected CSTRs. Two types of stainless steel wire baskets are buried into the sediments to facilitate sampling. One type of basket, designed to provide samples of the sediment surface, is 0.5 cm deep and has a surface area of 36 cm^2; the other type of basket, designed to provide a sample of the whole sediment column, is 2.5 cm deep and has a surface area of 9 cm^2.

A radiant energy system is located 0.6 m above the channel and consists of 784 1.2 m long Daylight fluorescent lamps structured in 3 horizontal tiers perpendicular to the channel axis. The system provides a continuously variable intensity range from zero to more than 6000 foot-candles at the flow channel surface.

The water supply is well water treated by reverse osmosis and deionization. Precise control of the influent water flow rate is achieved using a 1-liter constant head flask and regulating the flowrate by changing the length and orifice diameter of the flask effluent tube. Temperature of the influent water is controlled within 0.5^{o}C over a range of 1 to 40^{o}C. An ultraviolet sterilizer connected inline provides sterile incoming water.

The water chemistry of individual CSTRs is modified by introducing chemical concentrates continuously to selected CSTRs. Chemical concentrates are prepared and introduced into the channels with Harvard peristaltic pumps, Model 1203 (Harvard Apparatus, Co., Dover, Mass.) equipped with silicon tubing.

The addition of a toxicant is accomplished with an all glass constant-head system (Figure 1). The contents of Flask 1, a dilution of the toxicant in water, drips into Flask 2. A precisely metered amount drips into CSTR 1 from Flask 2 to achieve the desired concentration when diluted with the incoming water. The flow from Flask 1 into Flask 2 is slightly faster than

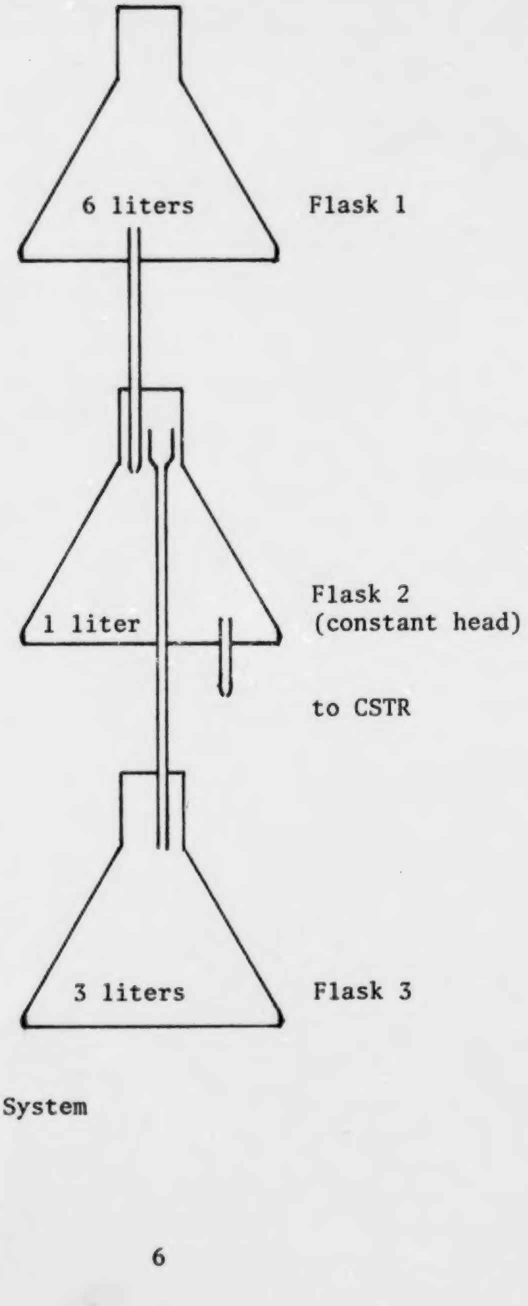

6 liters
Flask 1
1 liter
Flask 2
(constant head)
to CSTR
3 liters
Flask 3

Figure 1. Toxicant Feed System

the flow from Flask 2 into CSTR 1. The overflow from Flask 2 is collected in Flask 3 and recycled back into Flask 1 once a day, at the time when fresh toxicant stock is added to Flask 1. The flowrate of toxicant into the channels during this study was 2.0 ml/min.

CSTR CHARACTERISTICS

Figure 2 shows the experimental conditions of each channel. The purpose and nature of each treatment is summarized in the following sections.

CSTR 1

The environment of CSTR 1 was designed to test for photolysis of methyl parathion. This CSTR received a continuous input of nutrient-free water (345 ml/min). The pH was adjusted to 7 with a continuous input of 0.003 M NaOH. CSTR 1 was continuously illuminated with two banks of black light fluorescent lamps mounted above the CSTR, providing energy in the 300 to 400 nm wavelength range that is necessary for photolytic degradation of some toxicants (Zepp and Cline, 1977).

CSTR 2

The environment in CSTR 2 was designed to enhance alkaline hydrolysis. CSTR 2 received the effluent of CSTR 1 and a solution of NaOH (0.03 M, 4 ml/min) to bring the pH to 10.

CSTR 3

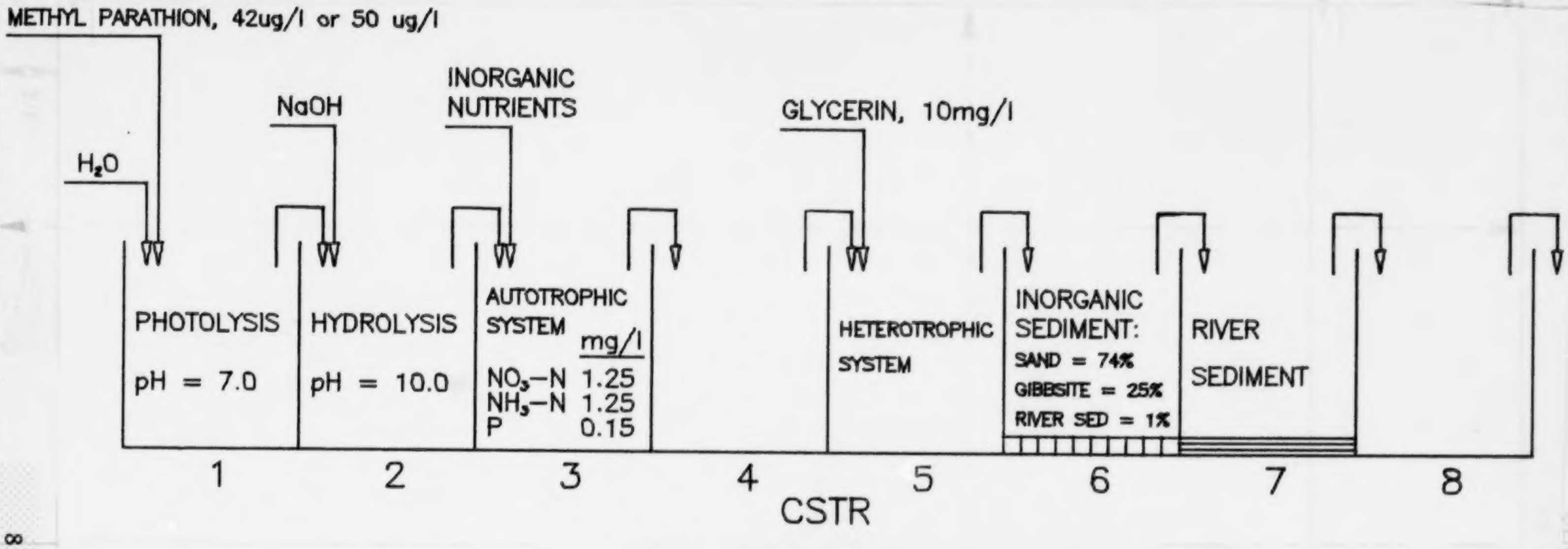
This CSTR was designed to enhance primary producer activity. It received the effluent of CSTR 2 and the input of two inorganic nutrient concentrates. The concentrates were modifications of Freeman's Reference Water (Freeman, 1953) with addition of micronutrients (Miller et al., 1978). The nutrients were separated into two concentrates to prevent precipitation of insoluble salts. Concentrate I contained per liter: 2.581 g $Na_2SiO_3 \cdot 9\ H_2O$, 0.112 g $Na_2HPO_4 \cdot 7\ H_2O$, and 4.123 g $NaHCO_3$; and concentrate II contained per liter: 1.171 g $MgSO_4 \cdot 7\ H_2O$, 0.536 g K_2SO_4, 0.620 g $NH_4\ NO_3$, 1.534 g $CaCl_2 \cdot 2\ H_2O$, 7.0 ml of 12 M HCl, and 8.245 ml micronutrient stock. The micronutrient stock contained per liter: 1.855 g H_3BO_3, 0.420 g $MnCl_2 \cdot 4\ H_2O$, 0.327 g $ZnCl_2$, 6.0 g $Na_2EDTA \cdot 2\ H_2O$, 14.0 mg $CoCl_2 \cdot 6\ H_2O$, 0.1 mg $CuCl_2 \cdot 2\ H_2O$, 73.0 mg $Na_2MoO_4 \cdot 2\ H_2O$, 1.599 g $FeCl_3 \cdot 6\ H_2O$. Concentrate I and II were each added to the water in CSTR 3 at a flow rate of 4 ml/min, providing water of the composition summarized in Table 1.

CSTR 4

CSTR 4 was designed to provide an additional primary producer community. CSTR 4 received only the effluent of CSTR 3.

CSTR 5

This environment, designed to further enhance microbial degradation of toxic compounds, received the effluent of CSTR 4 plus an input of glycerin to


METHYL PARATHION, 42ug/l or 50 ug/l
H₂O
NaOH
INORGANIC NUTRIENTS
GLYCERIN, 10mg/l
PHOTOLYSIS
pH = 7.0
HYDROLYSIS
pH = 10.0
AUTOTROPHIC SYSTEM
mg/l
NO₃–N 1.25
NH₃–N 1.25
P 0.15
HETEROTROPHIC SYSTEM
INORGANIC SEDIMENT:
SAND = 74%
GIBBSITE = 25%
RIVER SED = 1%
RIVER SEDIMENT
1
2
3
4
5
6
7
8
CSTR

Conditions

H_2O Flow = 500 l/Day
CSTR Retention Time = 12 Hr
Mixing Rate = 2 RPM
H_2O Temp = 20°C
Light = 2500 or 3000 Foot Candles
(12 hr light, 12 hr dark)

Figure 2. Experimental Conditions of Each Channel.

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Table 1. Concentrations of Nutrients Entering Channel After Final Dilution.

Macronutrients	mg/l	Micronutrients	µg/l
P	0.149	B	31.0
Si	2.94	Mn	11.1
HCO_3	34.5	Zn	14.9
Mg	1.33	Fe	31.4
K	2.77	Co	0.329
N	2.50	Cu	0.00354
Ca	4.82	Mo	2.75
Na	26.3	EDTA	440
SO_4	8.66		
Cl	43.3		

stimulate heterotrophic growth. The concentration of glycerin when mixed with the incoming water was 10 mg/l (4 mg/l carbon).

CSTR 6

This CSTR, receiving the effluent of CSTR 5, was designed to test the influence of inorganic sediments on the fate of toxic compounds. The sediment tray contained sediment consisting of 74% Ottawa sand, 25% Gibbsite ($Al_2O_3 \cdot 3\ H_2O$), and 1% natural sediments from the Oconee River in north Georgia to provide an inoculum of bottom dwelling organisms.

CSTR 7

CSTR 7, receiving the effluent of CSTR 6, was designed to test the influence of a natural sediment on the fate of toxic compounds. The sediment tray in this CSTR contained 100% Oconee River sediments.

CSTR 8

This environment, receiving the effluent of CSTR 7 but containing no sediments, represented a mature aquatic ecosystem.

Biological communities were established in CSTRs 3 through 8 by inoculating each CSTR with a 4-liter inoculum from two local ponds, a stream, and a river. After mixing, each CSTR was cross inoculated with a 1-liter sample from the corresponding CSTR in the replicate channel. Reinoculation and cross inoculation were performed once a week for the duration of each experiment.

EXPERIMENTAL DESIGN

Two long-term experiments, performed from December, 1978, to May, 1979, and June to September, 1979, were completed using methyl parathion as the toxicant. Methyl parathion was selected for study because its transformation process rates and its equilibrium constants are known; it is readily measureable in water, sediment, and biota; and calculations using process information indicated that measurable decomposition should occur within the residence time achievable in the CSTRs.

Methyl parathion sorbs to sediments with a partition coefficient of 50 and to biota with a partition coefficient of 475. It is slightly volatile and photolyzes in ultraviolet light. It hydrolyzes by neutral and alkaline hydrolysis. Finally, it reportedly is degraded by bacteria with an average rate constant of 2.4×10^{-7} ml $cell^{-1}$ hr^{-1} (Smith et al., 1978).

Channels A and B were treated as replicates for both long-term studies. Water and nutrient flows were started 2 weeks prior to initial inoculation of the CSTRs. Between 2 and 4 weeks after initial colonization, a low level (5 µg/l) input of methyl parathion was started to allow the system to acclimate to the toxicant. Two weeks later the concentration was increased to the level selected for each study (42 µg/l in Experiment 1; 50 µg/l in Experiment 2).

Water chemistry samples from each CSTR were analyzed four times a week for nitrite, nitrate, ammonia, total Kjeldahl nitrogen, total phosphorus, ortho-phosphorus, pH, and dissolved oxygen.

The biological community in the water, aufwuchs, and sediments were analyzed every 2 to 3 weeks beginning approximately 8 weeks into the study. Each biological community was characterized by quantitating bacteria, algae, chlorophyll a, adenosine triphosphate (ATP), and methyl parathion; in addition, organic carbon was measured in the aufwuchs, and ash-free dry weight was determined for sediments and aufwuchs.

Experimental conditions for each experiment are summarized in Table 2. Experiment 2 should not be considered a duplicate of Experiment 1 because factors such as light intensity, methyl parathion concentration, and inocula were different.

Table 2. Environmental Conditions During Experiments 1 and 2.

Factor	Experiment 1	Experiment 2
Experimental Duration	12/26/78 - 5/2/79	6/12/79 - 9/24/79
Water Flow	500 l/day	500 l/day
Retention Time	12 hours	12 hours
Water Temperature	20°C	20°C
Mixing Rate	2 rpm	2 rpm
Light	3000 foot candles	2500 foot candles
Light Cycle	12 hours light	12 hours light
Inocula	Winter-spring populations	Spring-summer populations
Methyl Parathion	5 μg/l (Begun 1/16/79) 42 μg/l (Begun 2/6/79)	5 μg/l (Begun 6/19/79) 50 μg/l (Begun 7/10/79)

SECTION 5

WATER

INTRODUCTION

The physical and chemical parameters of aquatic ecosystems influence the fate of pollutants in the ecosystems. Light quality and intensity affect photolysis rates (Wolfe et al., 1976; Zepp and Cline, 1977), pH controls hydrolysis rates (Benson, 1960), water turbulence affects transport and gas exchange (Tsivoglou, 1967), and temperature affects processes such as microbial degradation of pollutants and hydrolysis (Baughman and Burns, 1979).

The studies under discussion were designed with the assumption that community development and function in the laboratory ecosystems could be controlled by controlling the physical and chemical parameters. Samsel and Parker (1972) used microcosms to show that algal productivity is controlled by physical-chemical parameters, rather than by the genetic potential of the inocula. A second assumption in the experimental design was that a stable state would be achieved; steady state being defined as minimal change in the chemical parameters. The achievement of a steady state within microcosms has been evaluated in a variety of ways. P/R ratios of 1.0 (Odum, 1971), equivalent influx and outflow nutrient levels (Confer, 1972), system level parameters within two standard errors of the mean defined as the "normal operating range" (Leffler, 1977), and coefficients of variation of approximately 10 to 20% (Giddings and Eddlemon, 1977, 1979) have all been used to characterize microcosms at steady state. Objectives of analysis of this phase were (1) to demonstrate that chemically stable states were achieved in the laboratory ecosystems, (2) to determine whether chemically distinct environments were established in each CSTR, and (3) to determine whether the different organic and inorganic treatments yielded structurally and functionally different ecosystems.

MATERIALS AND METHODS

Water Chemistry

Chemical levels were routinely measured in each CSTR four times per week: Tuesday and Friday at 0800 hours (after 12 hours of darkness) and Monday and Thursday at 1500 hours (after 7 hours of light). Oxygen (Orbisphere Model 2708) and pH (Beckman Model 941 and Electromate) were measured *in situ*. For other water chemistry parameters, water was collected, filtered through Gelman HT 450 filters and dispensed for individual analyses. Ammonia nitrogen (NH_3-N), nitrite nitrogen (NO_2-N), nitrate nitrogen (NO_3-N), ortho-phosphorus (O-P), total dissolved phosphorus (TDP), and total Kjeldahl nitrogen (TKN) were quantitated using EPA (1979) methods and a Technicon Autoanalyzer II system. All water chemistry data was expressed in mg/l concentrations.

Aquatic Biology

Biological sampling was initiated 8 weeks after inoculation when evaluation of chemical analyses indicated that the microcosms were not undergoing rapid change. Generally sampling occurred on a biweekly schedule; however, several sampling events occurred at intervals longer than 2 weeks. The suspended aquatic community was sampled with a beaker or a glass sampling tube, blended for 30 seconds at low speed, and dispensed for analyses.

In both experiments, bacterial biomass was estimated using standard plate counts (APHA, 1976). Results were expressed as colony-forming units (CFU) per milliliter of the water.

In Experiment 1, chlorophyll a was extracted using the acetone extraction method (APHA, 1976) for planktonic communities. Samples were frozen prior to grinding with levigated alumina (F. Farmer, The Bionetics Corporation, pers. comm.). In Experiment 2, extraction of chlorophyll a was facilitated by filtering a water sample with Gelman Type A glass fiber filter, placing the filter in a Duran flask (B. Braun Instruments) containing 90% acetone, 0.45 to 0.5 mm glass beads (2:1 ratio, acetone:beads) and a $MgCO_3$ suspension and then homogenizing for 2 minutes using the B. Braun Cell Homogenizer (B. Braun Instruments) while cooling the sample with CO_2. Chlorophyll a corrected for phaeophytin a was determined fluorometrically (Strickland and Parsons, 1968) using a Model 111 fluorometer (G.K. Turner and Associates) equipped with a Corning excitation filter (CS-5-60) and a Corning emission filter (CS-2-64). Sample fluorescence was compared to chlorophyll a standards (Sigma Chemical Co.) prepared the day of sample analysis. Results were expressed as µg/l.

Cellular ATP was extracted from suspended community samples using the boiling tris buffer method (APHA, 1976). Samples were collected on 0.45 µm Millipore filters and inserted in test tubes maintained in a boiling water bath. Boiling tris buffer (0.02 M, pH 7.8) was added and the sample extracted for 5 minutes. Lyophilized firefly lantern extract (FLE-50, Sigma Chemical Co.) was hydrated according to supplier's directions and aged overnight in the dark at room temperature. Sample extracts were assayed with a photometer (Model 3000 Science Applications Incorporated) by integrating light flux measurements for 60 seconds. Results were reported in nanograms per liter.

Counting and identifying algae was facilitated using the inverted microscope method of Utermohl as described by Lund et al. (1958). Preserved samples were settled for a minimum of 20 hours on sedimentation slides, and counting and identifying algae was completed using a Zeiss Invertoscope D equipped with bright field, phase contrast, and differential interference contrast capabilities. Identification was accomplished at a magnification of 504X or 800X, using various algal keys for reference (Appendix A). Algal density was determined by counting at a magnification of 320X.

In Experiment 1, samples were fixed with merthiolate preservative (Weber, 1968). Algal numbers were based upon an observation of 400 cells or more of the total sample and at least 100 cells of the most abundant genus. Results were expressed as algal cells per milliliter of water.

In Experiment 2, samples were fixed and stained with a modified acid Lugols' solution (10.0 g I, 15.0 g KI, and 20.0 ml glacial acetic acid in 1-liter distilled water; Prescott, 1970). Because of the dominance of filamentous and colonial forms, counts were not completed. Instead, the relative frequency of occurrence (McIntire, 1968) of each algal genus was determined based upon observation of 20 fields of view (1.8 mm^2) at 320X. At the end of the study, algae were identified to the species level in each CSTR.

For identification and enumeration of the zooplankton during the second study, a 75-ml water sample was centrifuged for 10 minutes at 2000 x G. From the pellet formed by algal filaments and zooplankton, a 1 ml sample was diluted with 0.3 ml 10% methyl cellulose to retard movement (Jahn, 1979), and a depression slide (0.15 ml volume) was filled with the suspension for counting. Forty fields (11.33 mm^3) were usually counted using a Zeiss Invertoscope D. Dominant genera were noted, and the protozoan populations were grouped as (1) colorless flagellates, (2) sarcodines (Heliozoida, Amoebida, and Testacida), and (3) ciliates (Holotrichida, Peritrichida, and Spirotrichida). Cysts and resting stages were not included in the data.

As a relative estimate of community metabolism, the differences between dissolved oxygen concentrations of the two readings per week at 1500 hours and the two readings per week at 0800 hours were calculated. These rates of change were not corrected for diffusion, inflow, or outflow from each CSTR. Results were expressed as milligrams of oxygen per liter per week.

Methyl Parathion

Sampling of methyl parathion in the water column began at the time of toxicant input and usually at biweekly intervals thereafter; however, on several occasions sampling occurred at intervals other than 2 weeks.

During the first experiment, an unfiltered sample of the suspended community was extracted with three fractions of methylene chloride, the fractions were combined, and anhydrous sodium sulfate added to absorb remaining water (extraction efficiency = 98 to 100%). The resultant sample was evaporated to approximately 0.5 ml and diluted to an exact volume with methylene chloride (Payne et al., 1974). Standards were extracted with methylene chloride and treated in a manner similar to the samples. Extracts were analyzed using a Tracor MT 220Q gas chromatrograph equipped with a Hall Model 700 electrolytic conductivity detector. Periodic checks of random samples were made using a duplicate model gas chromatograph equipped with a Tracor N-P detector.

During the second experiment, samples of the suspended community were extracted directly using iso-octane (extraction efficiency = 97.4%) (Paris et al., 1975). Standards were also prepared in iso-octane. Extracts were analyzed on a Tracor Model 550 gas chromatograph, equipped with a ^{63}Ni electron capture detector. The column used for separation of the compound was a 1/4 in x 4 ft glass column packed with 3% SE-30 on 80/100 gas chromatograph Q. In both experiments, methyl parathion concentrations were reported as micrograms per liter.

Statistical Analyses

For both experiments, the means and associated confidence intervals ($\alpha = 0.10$) of the total dissolved phosphorus and total dissolved inorganic nitrogen concentrations from 0800 hours of each CSTR from Channel A and B of any one week were calculated. Total dissolved inorganic nitrogen was determined by summing nitrate, nitrite, and ammonia concentrations from 0800 hours. The means and confidence intervals ($\alpha = 0.10$) of the change in dissolved oxygen concentrations of each CSTR of Channel A and B of any one week were calculated. The means and confidence intervals of the three parameters were plotted from the date of methyl parathion introduction at the higher concentrations (Experiment 1, 2/5/79; Experiment 2, 7/9/79) to the termination of each study.

Analysis of variance of the total dissolved phosphorus, total dissolved inorganic nitrogen, and change in dissolved oxygen concentrations was performed using the BMD, P series package (UCLA, 1979). The mean values of methyl parathion concentrations and log-transformed biological data [$\log_{10}(x + 1)$] of each CSTR from both channels, taken from the five major sampling days in the first experiment and six major sampling days in the second study, were statistically evaluated through analysis of variance and analysis of covariance, respectively. Significant results of both types of analyses were summarized by Duncan's New Multiple Range Analysis (SAS, 1972). During the first experiment, data from the fifth week were eliminated due to failure of the light system and any outliers due to technical errors were eliminated.

RESULTS AND DISCUSSION

Stable State

An assumption made for testing EXAMS was that the laboratory microcosms would achieve a stable state within approximately 6 to 8 weeks of community development (Giddings and Eddlemon, 1977) and the testing of toxicant fate would proceed during this period of system stability. To evaluate system stability during the two studies of methyl parathion, the weekly mean total dissolved phosphorus, total dissolved inorganic nitrogen, and change in dissolved oxygen concentrations were examined for nonsignificant differences ($\alpha = 0.10$) in the confidence intervals during the experimental period. Within each CSTR, the period of time in which each parameter demonstrated similar mean values, based upon overlapping confidence intervals, was considered to represent a period of steady state (Jassby et al., 1977; Leffler, 1977). Although the three parameters demonstrated different overall trends between the two experiments, the laboratory ecosystems during both experiments generally exhibited stable states in all CSTRs (Figures 3 through 8).

During the 11 weeks of the first study, the ecosystems in each CSTR were stabilizing through the experimental period. The total dissolved inorganic nitrogen concentrations exhibited similar mean values through the experimental period in each CSTR, but total dissolved phosphorus concentrations in CSTRs 6 through 8 did not exhibit consistent nonsignificant differences until approximately 4 weeks after the introduction of methyl parathion (Figures 3 through 5).

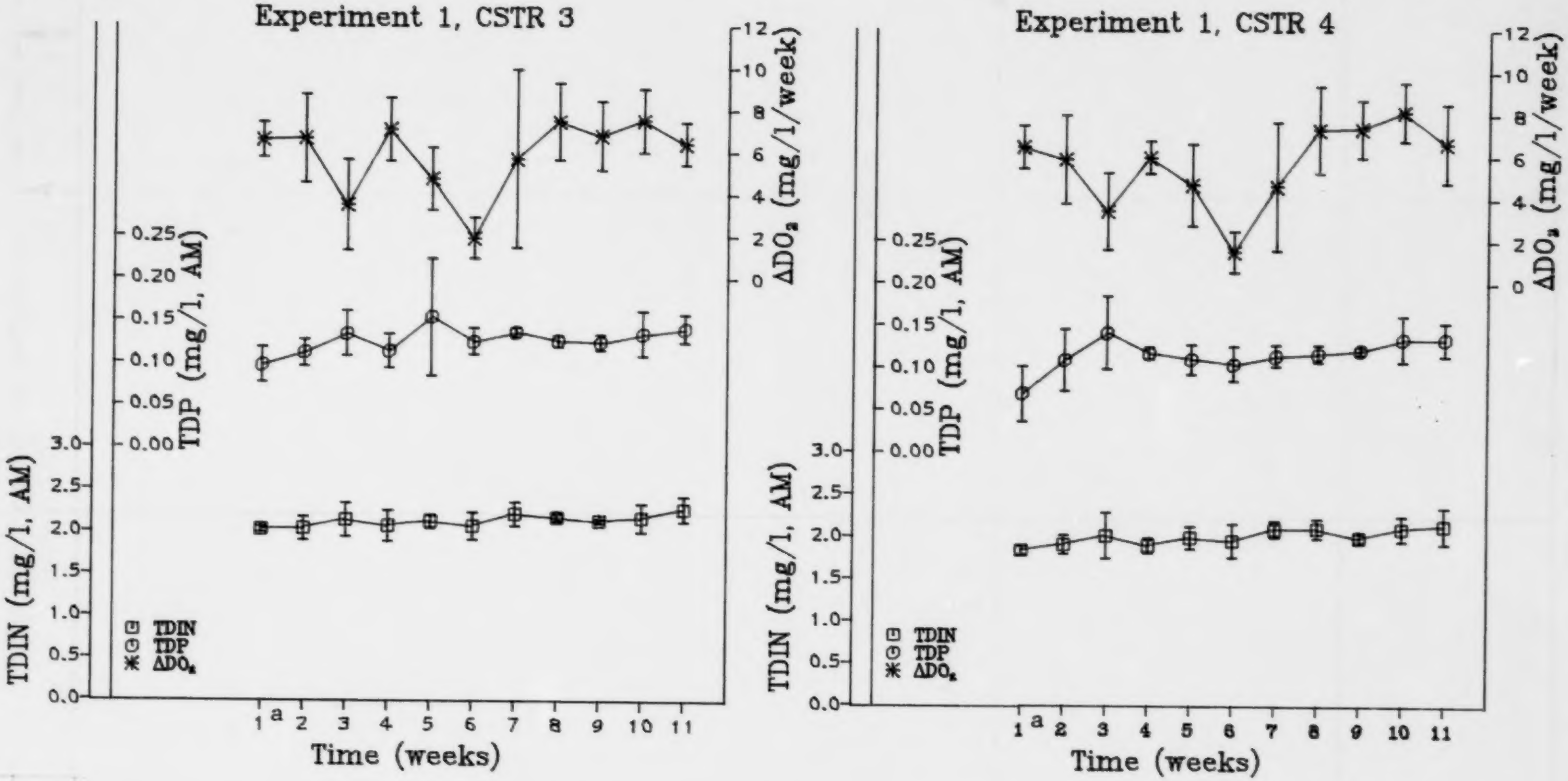

Figure 3. Mean and Confidence Intervals (α = 0.10) of Total Dissolved Inorganic Nitrogen, Total Dissolved Phosphorus, and Duirnal Dissolved Oxygen Flux - Experiment 1.

[a]Week 1 = Methyl Parathion Introduction (42 μg/1)

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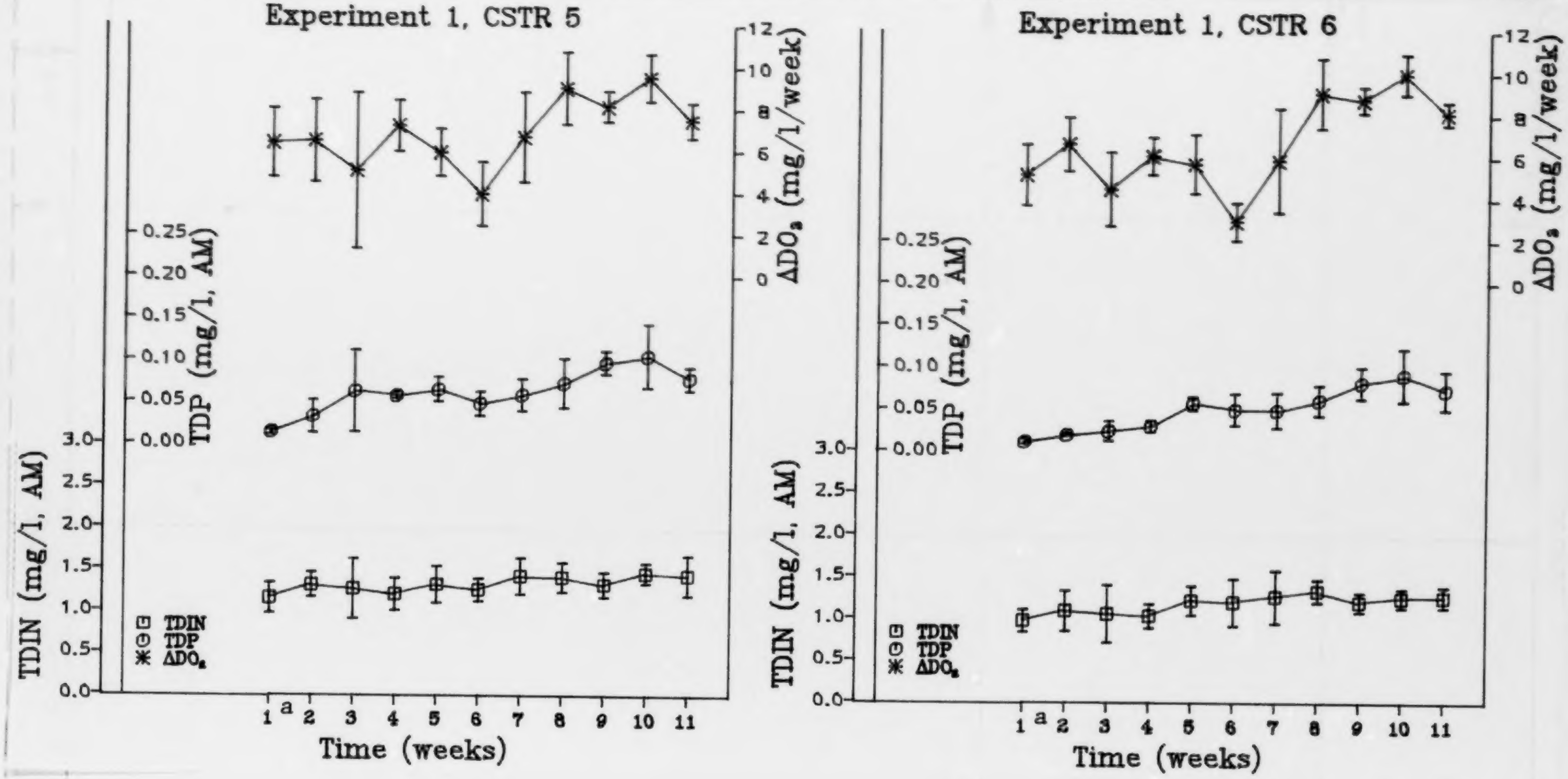

Figure 4. Mean and Confidence Intervals ($\alpha = 0.10$) of Total Dissolved Inorganic Nitrogen, Total Dissolved Phosphorus, and Diurnal Dissolved Oxygen Flux - Experiment 1.

[a]Week 1 = Methyl Parathion Introduction (42 μg/1)

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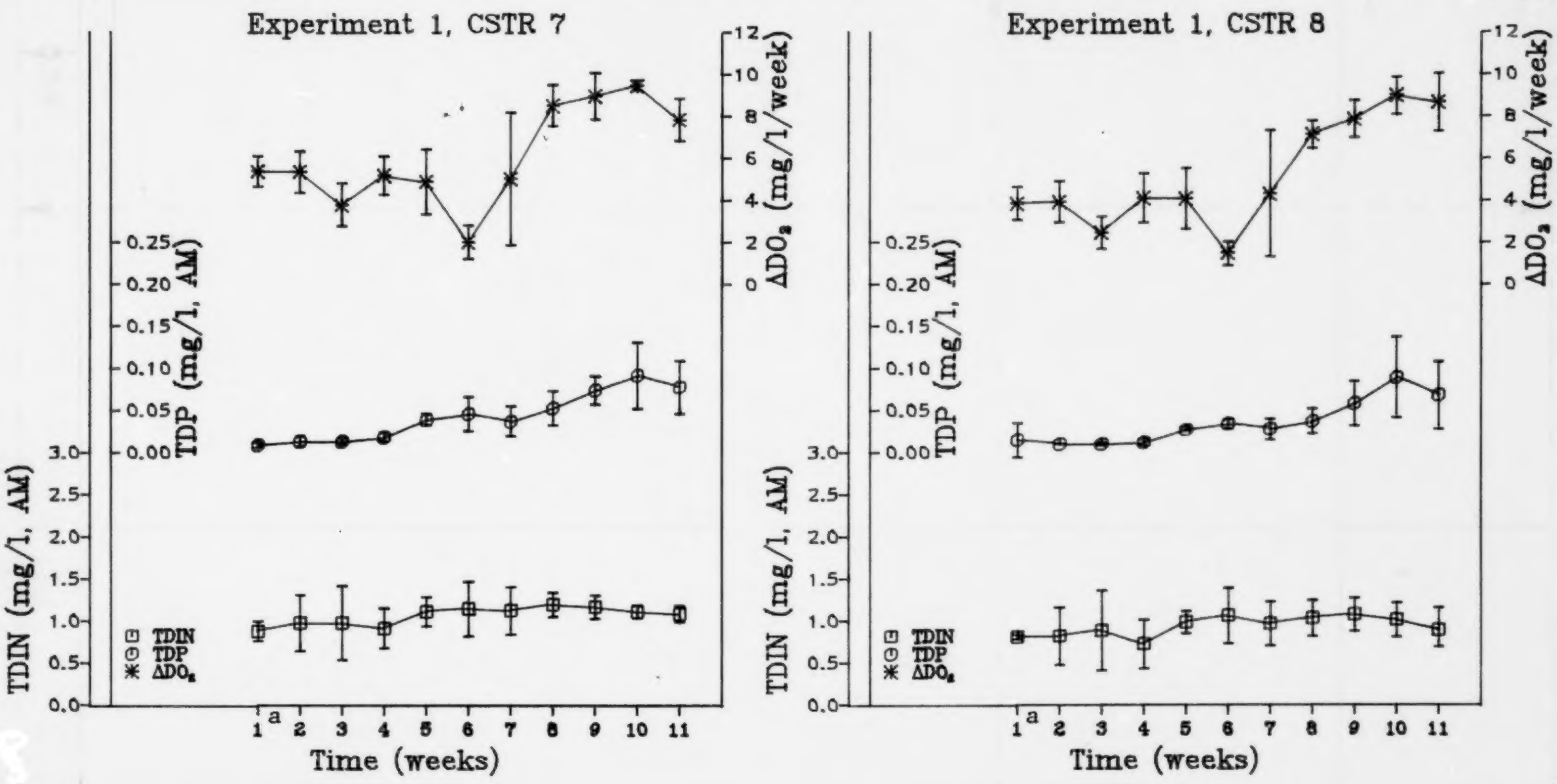

Figure 5. Mean and Confidence Intervals (α = 0.10) of Total Dissolved Inorganic Nitrogen, Total Dissolved Phosphorus, and Diurnal Dissolved Oxygen Flux - Experiment 1.

[a]Week 1 = Methyl Parathion Introduction (42 μg/l)

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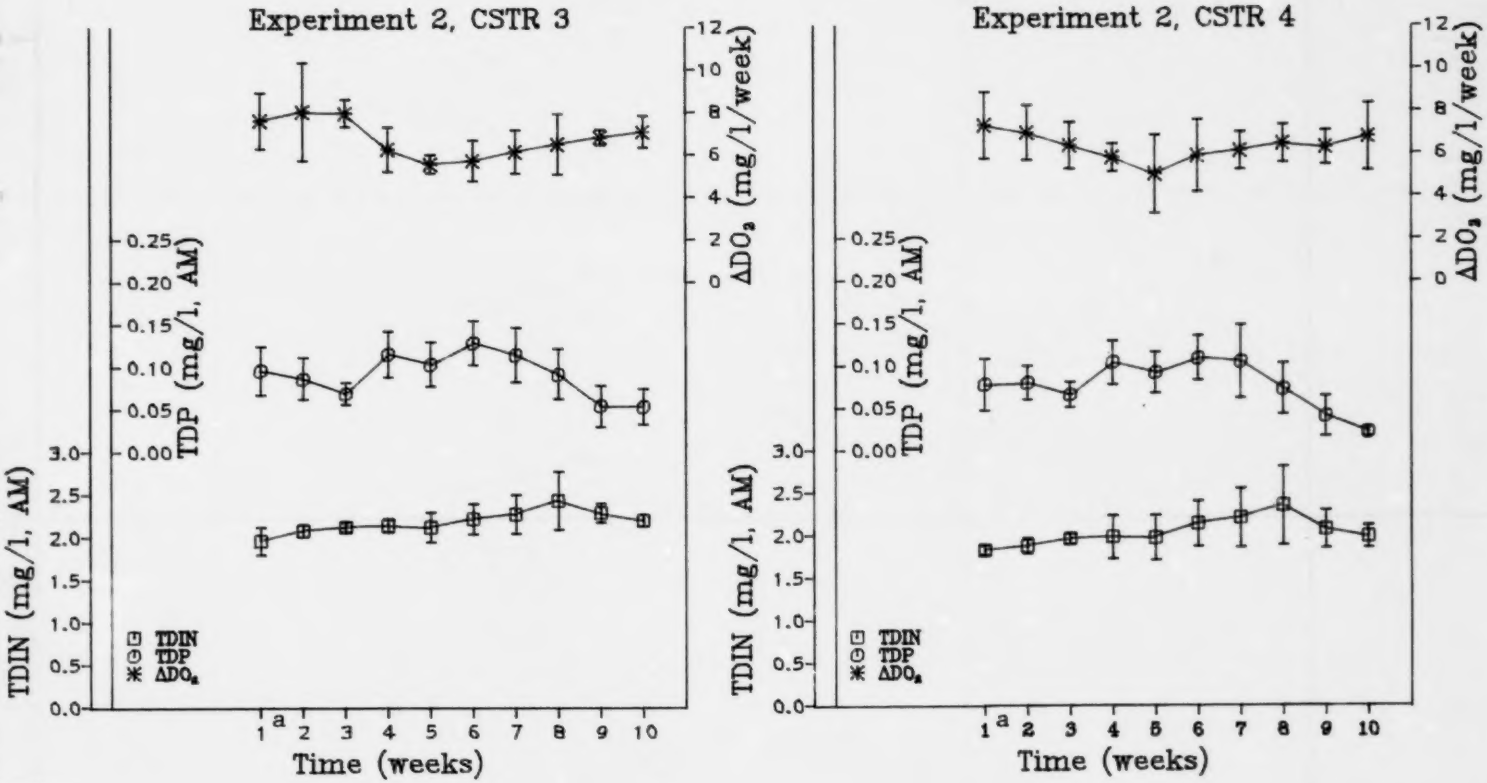

Figure 6. Mean and Confidence Intervals ($\alpha = 0.10$) of Total Dissolved Inorganic Nitrogen, Total Dissolved Phosphorus, and Diurnal Dissolved Oxygen Flux - Experiment 2.

[a]Week 1 = Methyl Parathion Introduction (50 μg/1)

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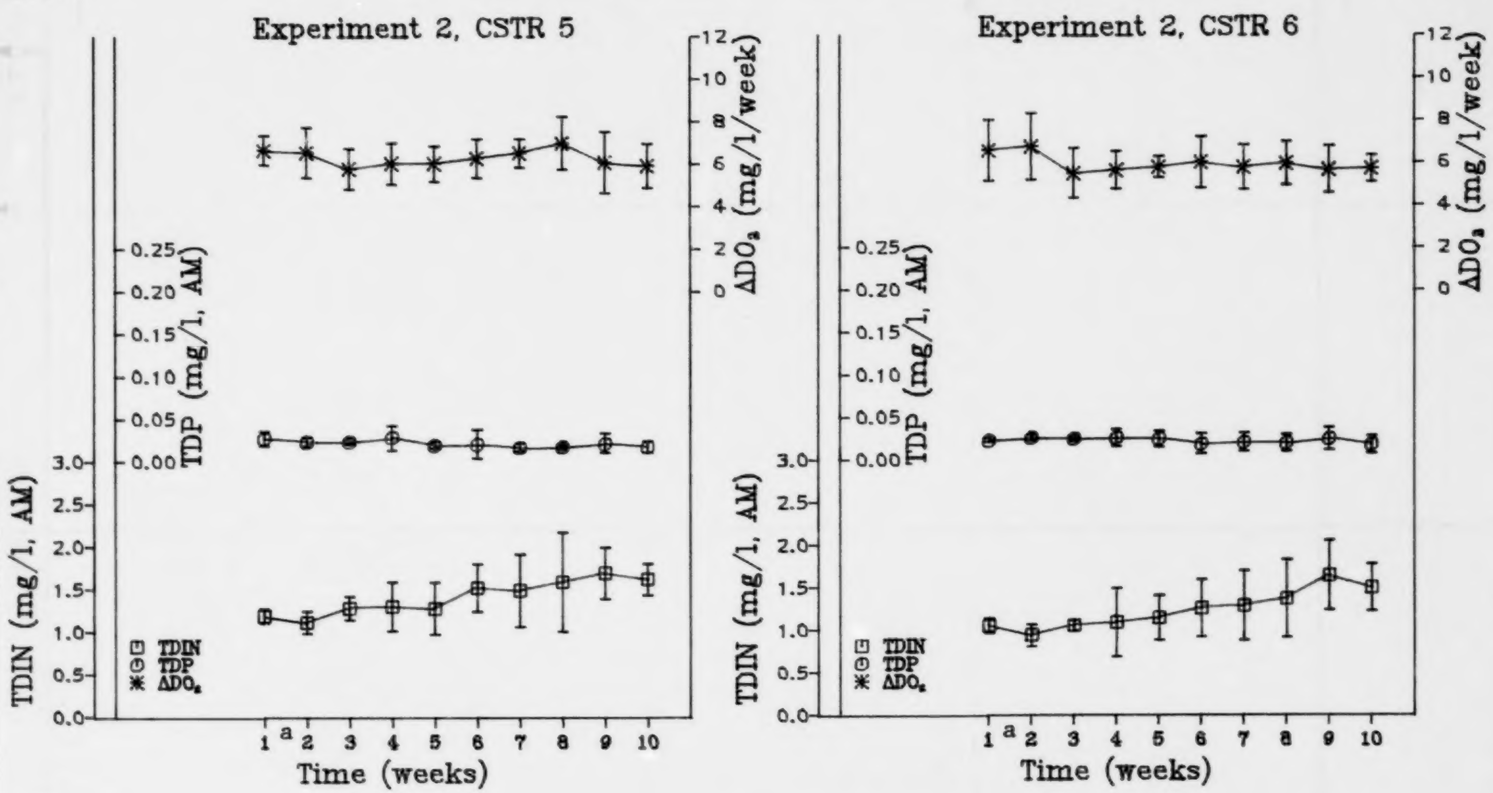

Figure 7. Mean and Confidence Intervals (α = 0.10) of Total Dissolved Inorganic Nitrogen, Total Dissolved Phosphorus, and Diurnal Dissolved Oxygen Flux - Experiment 2.

[a]Week 1 = Methyl Parathion Introduction (50 μg/1)

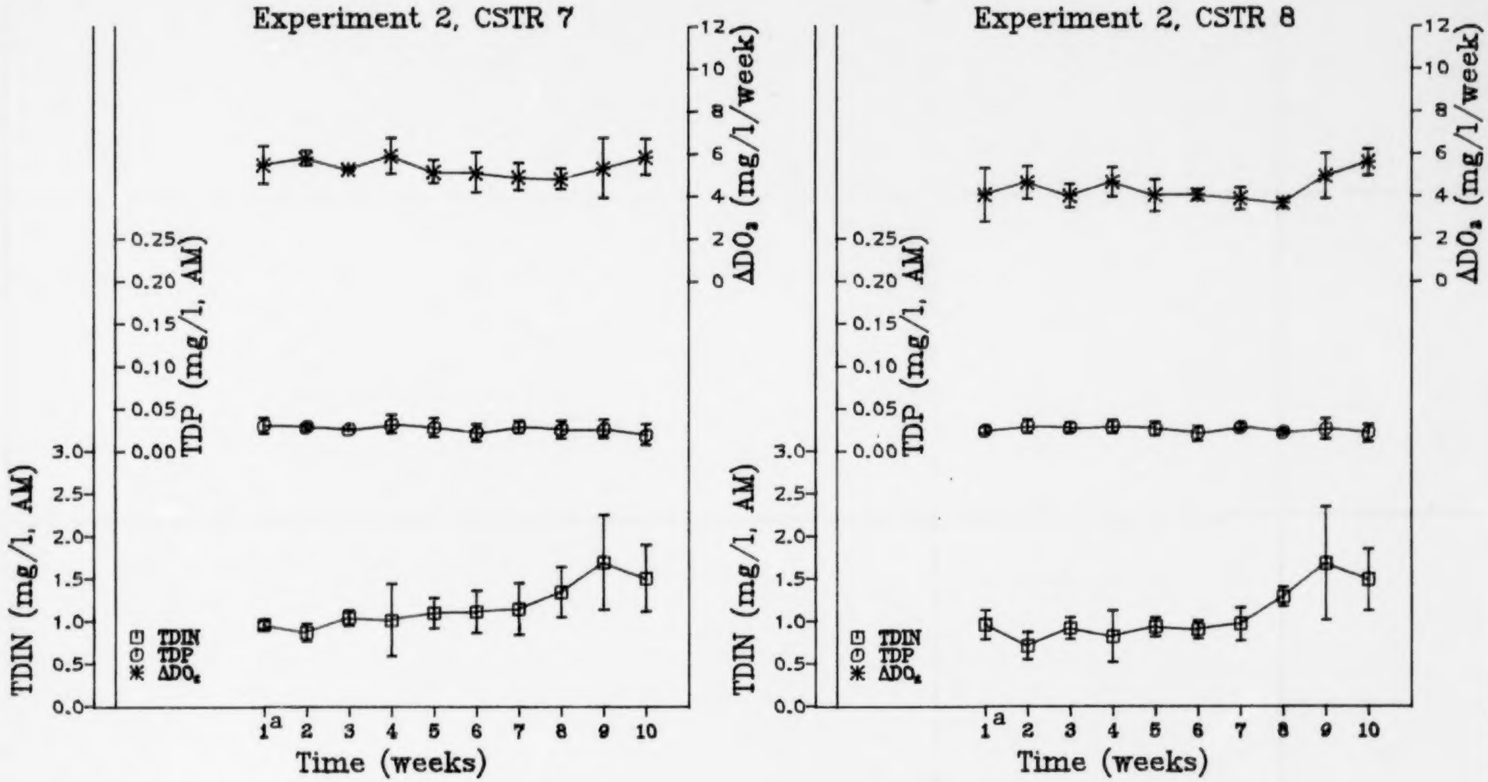

Figure 8. Mean and Confidence Intervals ($\alpha = 0.10$) of Total Dissolved Inorganic Nitrogen, Total Dissolved Phosphorus, and Diurnal Dissolved Oxygen Flux - Experiment 2.

[a]Week 1 = Methyl Parathion Introduction (50 µg/l)

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Weekly dissolved oxygen flux exhibited a larger variation in mean values indicating less stability in oxygen metabolism. Within each CSTR, oxygen metabolism values demonstrated a stable period early in the study (1 to 5 weeks) and another stable period with higher rates of change during the latter period (8 to 11 weeks) (Figures 3 through 5). A failure in the light system during week five (data excluded) may have had a long-term effect on community metabolism, which may be reflected in the relatively large fluctuation in oxygen metabolism rates during the first study.

During the 10 weeks of the second methyl parathion experiment, total dissolved inorganic nitrogen, total dissolved phosphorus concentrations, and relative estimates of oxygen metabolism demonstrated nonsignificant differences in mean values in each CSTR through the duration of the experimental period (Figures 6 through 8). Stable states were established early in the experiment and maintained stability through the study.

Nutrient Treatment Differences

During both experiments, CSTRs 3 of Channel A and B received inorganic nutrient input to enhance development of autotrophic communities while CSTRs 5 of both channels received an organic carbon source to stimulate development of heterotrophic microbial communities. The weekly mean values of total dissolved phosphorus and total dissolved inorganic nitrogen from 0800 hours were statistically analyzed to evaluate whether chemically different environments were established in each CSTR during each study.

During the first experiment, total dissolved phosphorus concentrations were observed to be different between CSTRs 5 and 8 and CSTRs 3 and 4 and the downstream compartments (Table 3). Total dissolved inorganic nitrogen concentrations exhibited differences between all CSTRs (Table 3).

During the second study, the total dissolved phosphorus concentrations were significantly different between those compartments (CSTRs 3 and 4) that received only inorganic nutrients and those compartments (CSTRs 5 through 8) that received both inorganic and organic nutrient input (Table 3). Total dissolved inorganic nitrogen concentrations exhibited differences between CSTRs 3 and 4 and the remaining compartments and CSTR 5 demonstrated significant differences from CSTRs 7 and 8 (Table 3). Generally, these results indicate that significantly different chemical environments were established in those compartments with inorganic and organic nutrient input as compared to those compartments with inorganic nutrient additions alone.

Community Characterization

Observations of the suspended algal community during the first experiment revealed the presence of 28 genera, the majority of which were attributable to the Chlorophyta. Total algal cell densities ranged from 1.6 to 5.9×10^3 cells/ml (Table 4). Genera of the Chlorophyta and Cyanophyta achieved densities ranging from 1.3 to 7.4×10^3 and 1.8×10^2 to 1.5×10^3 cells/ml, respectively. The Chrysophyta achieved densities that varied from 6.4×10^1 to 3.8×10^2 cells/ml.

Table 3. Duncan's New Multiple Range Test of Total Dissolved Phosphorus and Total Dissolved Inorganic Nitrogen. (α = 0.05).

<table>
<tr><th>Parameter</th><th colspan="6">Experiment 1</th><th colspan="6">Experiment 2</th></tr>
<tr><td>TDP</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CSTR</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>3</td><td>4</td><td>7</td><td>8</td><td>6</td><td>5</td></tr>
<tr><td>Mean</td><td>0.126</td><td>0.115</td><td>0.063</td><td>0.049</td><td>0.043</td><td>0.035</td><td>0.091</td><td>0.077</td><td>0.028</td><td>0.026</td><td>0.022</td><td>0.020</td></tr>
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<tr><td>CSTR</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>Mean</td><td>2.129</td><td>2.005</td><td>1.326</td><td>1.171</td><td>1.067</td><td>0.942</td><td>2.182</td><td>2.046</td><td>1.407</td><td>1.239</td><td>1.186</td><td>1.079</td></tr>
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Table 4. Algal Diversity[1] and Mean Density[2] - Experiment 1, Suspended.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta	$4.4\text{x}10^2$(2)	$1.8\text{x}10^2$(2)	$6.8\text{x}10^2$(1)	$1.4\text{x}10^3$(3)	$1.9\text{x}10^2$(3)	$1.5\text{x}10^3$(5)
Chlorophyta	$7.4\text{x}10^3$(11)	$4.6\text{x}10^3$(12)	$4.8\text{x}10^3$(12)	$3.2\text{x}10^3$(14)	$1.3\text{x}10^3$(12)	$5.0\text{x}10^3$(13)
Chrysophyta	$3.8\text{x}10^2$(4)	$6.4\text{x}10^1$(4)	$2.4\text{x}10^2$(4)	$2.7\text{x}10^2$(3)	$1.8\text{x}10^2$(5)	$1.1\text{x}10^2$(6)
Total	$5.9\text{x}10^3$(17)	$5.1\text{x}10^3$(18)	$5.4\text{x}10^3$(17)	$4.9\text{x}10^3$(20)	$1.6\text{x}10^3$(20)	$3.6\text{x}10^3$(24)

[1] Parentheses indicate diversity-expressed as total genera observed

[2] Density expressed as cells/ml; mean based upon sampling dates: 2/20/79, 3/27/79, 4/10/79

Members of the Chlorophyta dominated each compartment on the basis of the diversity of taxa reported. Total algal diversity ranged from 17 to 24 genera among the various compartments, with the highest number reported from CSTR 8 in which the Cyanophyta, Chlorophyta, and Chrysophyta composed 5, 13, and 6 genera, respectively (Table 4). Scenedesmus, Chlorogonium, Stigeoclonium, and Oedogonium of the division Chlorophyta; Oscillatoria and Microcystis of the Cyanophyta; and Tribonema of the Chrysophyta were the dominant genera of algae, i.e., those representing 10% or more of the mean total density (Table 5) observed in the suspended community. The contribution of the above seven genera to the mean total densities of all compartments varied from 70 to 87% (Table 5). These observations of dominance do not take into consideration the differences among biovolumes of the various genera recorded.

During the second experiment analyses of the suspended community revealed the presence of 10 algal genera comprising four divisions: Cyanophyta, Chlorophyta, Chrysophyta, and Cryptophyta. On the basis of taxonomic diversity, genera of the Chlorophyta were observed to dominate each CSTR. Total algal diversity ranged from 12 to 15 taxa among the various compartments (Table 6). Oscillatoria, Chlamydomonas, and Synedra of the divisions Cyanophyta, Chlorophyta, and Chrysophyta, respectively, were the dominant taxa reported (Table 7), based upon occurrence in >50% of the total fields of view (McIntire, 1968).

During the first methyl parathion experiment, mean values of bacterial biomass in the water column ranged from 4.3 x 10^4 cells/ml in CSTR 6 to 3.2 x 10^4 cells/ml in CSTR 8 (Appendix B, Tables B43 and B44). During the second experiment, bacterial biomass was generally one order of magnitude higher than those densities observed during the first experiment. Bacterial biomass ranged from 1.9 x 10^5 cells/ml in CSTR 4 to 8.2 x 10^5 cells/ml in CSTR 5 (Appendix B, Tables B43 and B44).

Nonpigmented flagellates tended to dominate the suspended protozoan community (Tables 8 and 9) with no apparent differences among the CSTRs. Although limited observations were made, the composite list of taxa (Table 10) shows that a diverse fauna consisting of over 40 genera were present in the channels.

Suspended Biological Community

The biological data collected from the suspended phase of each CSTR was statistically analyzed to determine whether the different chemical environments were reflected by the development of structurally different biological communities. The relative estimate of productivity, as diurnal dissolved oxygen flux, was also statistically analyzed to evaluate whether the communities were functionally different between CSTRs.

During the initial methyl parathion experiment, no significant differences ($\alpha = 0.05$) were observed in the mean biomass measurements between CSTRs (Table 11). These parameters measure discrete units of biomass rather than substances in solution, and because of this, some samples undoubtedly contained clumps of biomass resulting in large errors associated with each estimate.

Table 5. Relative Density of Dominant and Subdominant Algae[1,2] - Experiment 1, Suspended.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Chlorophyta						
Scenedesmus	42	26	17	46	30	17
Chlorogonium	18	52				
Stigeoclonium		9	57		24	
Oedogonium					16	25
Chlamydomonas	9					
Cyanophyta						
Oscillatoria	7		13	28		9
Microcystis						24
Merismopedia					8	
Chrysophyta						
Tribonema	10					
Total	86	86	87	74	78	75
Mean Total Density (cells/ml)	5.9×10^3	5.1×10^3	5.4×10^3	4.9×10^3	1.6×10^3	3.6×10^3

[1] Relative density expressed as the % of mean total density; based upon dates: 2/20/79, 3/27/79, 4/10/79

[2] Dominance is based on mean generic density of >10% of mean total density, Subdominance: 5 to 10%

Table 6. Algal Diversity[1] - Experiment 2, Suspended.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta	4	4	2	3	3	4
Chlorophyta	6	7	7	6	8	7
Chrysophyta	4	3	3	3	3	4
Total	14	14	12	12	14	15

[1] Diversity expressed as total genera observed, sampling dates: 7/24/79, 8/7/79, 8/21/79

Table 7. Relative Frequency of Occurrence[1] of Dominant and Subdominant Algae[2] - Experiment 2, Suspended.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta						
Oscillatoria	28	28	29	35	52	63
Chlorophyta						
Chlamydomonas	86	74	57	54	58	53
Scenedesmus	11	17	8	16	38	46
Ankistrodesmus		3	6	12	38	23
Chrysophyta						
Nitzschia	13	13	28	12	40	26
Synedra	63	67	46	58	25	21

[1] Expressed as a percentage of the fields of view in which a particular genus occurred (McIntire, 1968) based on 120 fields from 6 samples, sampling dates: 7/24/79, 8/7/79, 8/21/79.

[2] Dominance is based on occurrence in >50% of the total fields of view (McIntire, 1968) observed in 6 samples, Subdominance: 25 to 50%

Table 8. Zooplankton[a] in Channel A (Organisms/ml).

CSTR	July 13-17, 1979			August 6-9, 1979			September 4-7, 1979		
	F	C	R	F	C	R	F	C	R
3	153	153	11	71	13	0	238	13	15
4	317	32	174	246	0	0	97	71	114
5	439	128	8	245	0	0	177	21	12
6	161	213	5	3342	0	14	49	23	34
7	306	208	361	559	19	0	673	59	123
8	151	78	28	599	11	11	ND	ND	ND

[a] F = Colorless flagellates; C = Ciliates (Holotrichida, Peritrichida, and Spirotrichida); R = Rhizopods (Amoebida, Heliozoida, and Testacida)

ND = Not Determined

Table 9. Zooplankton[a] in Channel B (Organisms/ml).

CSTR	July 13-17, 1979			August 6-9, 1979			September 4-7, 1979		
	F	C	R	F	C	R	F	C	R
3	80	12	37	56	18	28	452	18	0
4	216	82	93	46	53	52	69	3	106
5	474	86	53	219	35	7	68	21	111
6	554	154	36	6449	0	20	230	207	150
7	544	46	266	1911	0	10	36	75	175
8	249	17	117	675	39	0	ND	ND	ND

[a] F = Colorless flagellates; C = Ciliates (Holotrichida, Peritrichida, and Spirotrichida); R = Rhizopods (Amoebida, Heliozoida, and Testacida)

ND = Not Determined

Table 10. Zooplankton Taxa Observed in Channels A and B, July - September, 1979.

Protozoa			Rotifiers	Others
Rhizopods	Ciliates	Flagellates (colorless only)		
Acanthamoeba sp.	Amphileptus sp.	Ancyromonas sp.	Euchlanis sp.	Oligochaetes
Actinophrys sp.	Aspidisca sp.	Anisonema ovale	Hexarthra sp.	Nematodes
Amoeba sp.	Blepharisma sp.	Astasia sp.	Lecane sp.	Flatworms
A. vespertilio	Bresslaua sp.	Bodo sp.	Lepadella sp.	Gastrotrichs
Arcella vulgaris	Colpoda sp.	Chilomonas sp.	Monostyla sp.	Chaoborus sp.
Centropyxis sp.	Cyclidium sp.	Colponema sp.	Philodina sp.	Daphnia sp.
Difflugia sp.	Dileptus sp.	Cyathomonas sp.	Polyarthra sp.	Calanoid copepod
Euglypha brachiata	Euplotes sp.	Heteronema sp.	Unknown	Nauplii
E. laevis	Lionotus sp.	Monas sp.		
Heleopera sp.	Loxodes sp.	Notoselenus sp.		
Limax amoeba (Vahlkampfidae, Hartmanellidae)	Microthoracids	Oikomonas sp.		
	Paramecium caudatum	Peranema sp.		
Mastigamoeba sp.	Podophyra sp.	Pleuromonas jaculans		
Pessonella sp.	Strombidium sp.	Unknown		
Thecamoeba sp.	Stylonychia sp.			
Vannella sp. (includes floating forms)	Vorticella sp.			
	Unidentified			
Unidentified	Other suctorians			
Other heliozoans				

Table 11. Duncan's New Multiple Range Test of Bacteria, Algae, Chlorophyll a, ATP[1], and Dissolved Oxygen Flux, Suspended. ($\alpha = 0.05$).

Parameter	Experiment 1						Experiment 2					
Bacteria												
CSTR	5	6	7	8	3	4	5	6	7	8	4	3
Mean	4.524	4.520	4.482	4.428	4.376	4.314	5.850	5.820	5.538	5.338	5.238	5.225
Grouping												
Algae												
CSTR	3	4	6	5	8	7	No Data					
Mean	3.76	3.67	3.59	3.53	3.51	3.41						
Grouping												
Chlorophyll a												
CSTR	3	4	5	6	7	8	8	3	5	6	7	4
Mean	0.81	0.75	0.73	0.68	0.61	0.58	0.97	0.90	0.88	0.87	0.86	0.77
Grouping												
ATP												
CSTR	5	6	4	8	3	7	6	4	3	5	7	8
Mean	3.32	3.25	3.15	3.07	3.07	2.96	3.40	3.21	3.16	3.14	3.05	2.98
Grouping												
DO												
CSTR	5	6	7	3	4	8	3	4	5	6	7	8
Mean	6.87	6.60	6.03	5.83	5.61	5.16	6.75	6.30	6.26	5.93	5.35	4.37
Grouping												

[1] logarithm$_{10}$(x + 1)

Diurnal oxygen metabolism rates also indicated no significant differences between CSTRs; however, because of a failure in the light system, wide variation in diurnal rates of dissolved oxygen change were observed in all CSTRs that may have obscured any differences in oxygen metabolism between CSTRs.

During the second experiment, of those parameters that estimate biomass, mean values of bacterial biomass were observed to be statistically different between CSTRs 5 and 6 and CSTRs 7 and 8 as well as CSTRs 3 and 4 (Table 11). Bacterial biomass values were higher (8.1 to 8.2 x 10^5 cells/ml) in CSTRs 5 and 6 than CSTRs 7 and 8 (5.2 to 3.1 x 10^5 cells/ml) or CSTRs 3 and 4 (2.2 to 1.9 x 10^5 cells/ml). The higher densities of bacteria in CSTRs 5 and 6 are probably the result of the organic carbon input in CSTR 5. Analysis of diurnal dissolved oxygen flux exhibited significant differences in community metabolism between CSTR 3 and CSTRs 6 through 8 (Table 11). Greater rates of dissolved oxygen flux were observed in CSTRs 3 through 5 indicating higher rates of productivity and respiration in these CSTRs. Higher rates of metabolism may be caused by the inorganic nutrient input in CSTR 3 and organic nutrient input in CSTR 5.

Estimates of algal diversity and density collected during methyl parathion investigations were examined in order to characterize the suspended community of the various compartments and to evaluate the influence of the various nutrient regimes. Three sampling dates from each experiment were chosen to evaluate these treatments.

Statistical comparisons of cell densities attributable to the Chlorophyta never differed significantly from the densities achieved by members of the Cyanophyta in any CSTR (Table 12), consequently the various nutrient regimes had no apparent influence on algal dominance.

Algal diversity varied from 17 to 24 genera during the initial study and from 12 to 15 taxa during the second investigation (Tables 4 and 6). During each experiment, dominant algal genera occurred under conditions established to stimulate heterotrophic as well as autotrophic populations. Although some taxa were observed more frequently in CSTRs 3 and 4 (*Synedra*, *Chlamydomonas*, *Chlorogonium*, and *Tribonema*), others were more often reported from downstream compartments designed to stimulate heterotrophic communities (*Oedogonium*, *Stigeoclonium*, *Oscillatoria*, *Microcystis*, *Ankistrodesmus*, and *Nitzschia*) (Tables 5 and 7). Furthermore, *Scenedesmus* was more frequently observed from CSTRs 3 and 4 during the first study and from CSTRs 5 through 8 during the second experiment. As a result, the various organic and inorganic nutrient treatments have no clear influence on the pattern of occurrence of the dominant algal taxa in the laboratory ecosystems.

The addition of inorganic sediments to CSTR 6 and river sediments to CSTR 7 was designed to enable evaluation of the influence of sediment substrates on community structure and function and toxicant fate in laboratory microcosms. Biomass estimates of the suspended community were analyzed statistically to determine variations between the two compartments. Duncan's New Multiple Range Test indicated no significant differences ($\alpha = .05$) between estimates of bacterial and algal densities, and chlorophyll *a* and

Table 12. Student's t Test Values of Algal Densities - Experiment 1, Suspended[1].

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta to Chlorophyta	1.70(5)	1.74(5)	1.66(5)	1.06(10)	2.26(3)	0.31(5)

[1] df in parentheses; means based upon three dates: 2/20/79, 3/27/79, 4/10/79

Critical t = 3.182 at df 3; 2.571 at df 5; 2.228 at df 10; $\alpha = 0.05$

ATP concentrations of CSTRs 6 and 7 (Table 11) and consequently the sediment substrates had no apparent effect on the suspended community. Statistical comparisons of bacterial biomass and community metabolism between these two CSTRs during the second study, however, exhibited significant differences with both bacterial biomass and diurnal dissolved oxygen flux observed to be higher in CSTR 6 (Table 11). These results indicate a possible influence of the inorganic sediment substrate on bacterial biomass in the water column as well as community metabolism.

Total algal diversity estimates indicated little to no difference between the suspended communities exposed to different sediment types. Twenty genera were recorded in both CSTRs 6 and 7 during the initial experiment, whereas in the second study 12 and 14 taxa were observed in CSTRs 6 and 7, respectively. Differences in algal community composition did exist, however, between the two compartments based upon the relative density of dominant and subdominant taxa in Experiment 1 (Table 5) and the relative frequency of occurrence of dominant and subdominant algae reported during Experiment 2 (Table 7). Although evaluation of biomass estimates and total algal density did not reveal significant differences between components of the suspended communities, the generic composition of the algal populations was observed to differ between CSTRs 6 and 7 in each experiment.

Methyl parathion concentrations were different for most CSTRs in Experiment 1 and for all CSTRs in Experiment 2 (Table 13). The difference in resolution between the two experiments probably was the result of a change in analytical methodology for Experiment 2. In Experiment 1, although there was a general pattern of decreasing methyl parathion concentrations down the channel, the percentage lost in each CSTR exhibited no pattern (Figure 9). In Experiment 2, however, the loss of methyl parathion appeared to be related to three types of treatment. In CSTRs 1 and 2 where photolysis and hydrolysis should dominate, the loss of methyl parathion was 4 and 7%, respectively. In CSTRs 3 and 4, enriched for autotrophic organisms, between 10 and 15% of the incoming methyl parathion was degraded per CSTR. These CSTRs also contained heterotrophs supported by the algal population that probably were involved in degrading the toxicant. In CSTRs 5 through 8, each designed to support additional heterotrophic populations, approximately 20% of the influent methyl parathion was lost in each CSTR.

SUMMARY

o In summary, a period of steady state, based upon nonsignificant differences in mean concentrations of total dissolved inorganic nitrogen, total dissolved phosphorus and rates of diurnal dissolved oxygen flux, was established in each CSTR during both experimental periods.

o Generally, chemically distinct environments were observed to group into those compartments with inorganic nutrient additions alone (CSTRs 3 and 4) as compared to those compartments with inorganic and organic nutrient additions (CSTRs 5 through 8).

o Although analysis of nutrient concentrations indicated that different chemical environments existed in the CSTRs, biomass estimates did not con-

Table 13. Duncan's Multiple Range Test for Methyl Parathion. ($\alpha = 0.05$).

Parameter	Experiment 1								Experiment 2							
Methyl Parathion																
CSTR	1	3	2	4	5	6	7	8	1	2	3	4	5	6	7	8
Mean	39.1	27.8	26.1	22.1	15.8	13.4	8.1	6.2	48.0	44.9	38.7	34.2	27.7	21.0	16.4	12.6
Grouping				———	———	———										
	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———
			———	———	———											

sistently reflect these differences. Community metabolism did not consistently demonstrate functionally different biological communities.

o Although no patterns were observed during the first study, the percentage disappearance of methyl parathion increased consistently in each successive compartment during the second study.

o Photolysis, hydrolysis, and volatilization rates, calculated from data collected in AEcoS, were negligible when compared to microbial-mediated rates of degradation (Appendix C).

SECTION 6

SEDIMENTS

INTRODUCTION

Bottom sediments can significantly affect the fate of compounds in aquatic ecosystems. Characteristics of the sediments, of the overlying water column, and of the chemical compound in question all interact to determine the role of sediments in a given water body (Oschwald, 1972; Toth and Ott, 1970; McKee et al., 1970). Objectives of this phase of the study were (1) to determine whether a natural sandy river sediment provided an environment significantly different from a contrived sediment, (2) to test whether shallow sediments have characteristics different from deep sediments, and (3) to test whether sediments affect the fate of methyl parathion.

MATERIALS AND METHODS

The sediment tray in CSTR 6 contained 74% Ottowa sand, 25% Gibbsite, and 1% Oconee River sediment as an inoculum; the sediment tray in CSTR 7 contained 100% Oconee River sediment. Characteristics of the sediments are summarized in Table 14. Shallow and deep stainless steel wire baskets were filled with the appropriate sediment, embedded in each tray at the start of the experiments, and removed from the sediment tray for analysis at selected sampling times.

In Experiment 1, the algal mat on the sediment was mixed with the sediment prior to dispensing sediments for analyses; in Experiment 2, the algal mat was removed from the basket prior to mixing and dispensing for subsequent analyses.

During the final sampling period of both experiments, the sediment trays were removed from each CSTR. In Experiment 1, the sediment was partitioned into the top algal mat, an upper sediment layer, and a lower sediment layer for ash-free dry weight and bacterial counts; in Experiment 2 the surface algal mat was removed and integrated sediment samples were collected for several analyses.

Biological Analyses

During both experiments, bacteria biomass was estimated using standard plate counts (APHA, 1976) and results were expressed as CFU/g dry weight of the sediment.

Ash-free dry weight measurements were accomplished using the procedure outlined for periphyton (APHA, 1976).

In Experiment 1, chlorophyll a was extracted from sediment samples by steeping in 90% acetone at $5^{o}C$ in the dark for 24 hours (APHA, 1976); in Experiment 2 sediment samples were added to a Duran flask (Braun Instruments) and handled in the same manner as the water samples (Section 5). Chlorophyll a corrected for phaeophytin a was determined as outlined in Section 5.

Table 14. Characteristics of Gibbsite-Sand Sediments and Oconee Sediments Added to the Channels.

Parameter	Gibbsite-Sand	Oconee
Chlorophyll a, µg/g	0.00	0.52
Phaeophytin a, µg/g	0.00	1.88
Chlorophyll a/Phaeophytin a	---	0.27
AFDW, mg/g	72.51	10.77
pH	7.5	6.1
Organic Carbon, %	0.00	0.27
Particle Size		
Sand (0.05 mm)	85.4%	90.0%
Silt (0.05 - 0.002 mm)	14.5%	8.1%
Clay (0.002 mm)	0.1%	1.9%

In Experiment 1, ATP was extracted from sediments using the boiling tris buffer procedure (APHA, 1976); in Experiment 2, ATP was extracted with hot $NaHCO_3$ solution (Bancroft et al., 1976). After extraction, the samples were centrifuged, the supernatant was decanted, and adjusted to pH 7.8. The lyophylized firefly lantern enzyme (FLE-50, Sigma Chemical Co.) was prepared as described in the materials and methods in Section 5, and ATP was measured as outlined in Section 5.

Methyl Parathion

Methyl parathion was extracted from sediments using a soxhlet extraction method (Payne et al., 1974). Sediment samples were filtered on tared Whatman #42 filters to remove excess water, the sample and filter were then transferred to a soxhlet extractor and refluxed with methylene chloride for 4 hours. Extraction efficiency for the natural sediments was 95 to 96%; for the contrived sediments it was 84 to 86%. The sample extract was handled as described in Section 5. The sediments remaining after extraction of methyl parathion were dried at 105°C overnight and weighed.

RESULTS AND DISCUSSION

Methyl parathion was not detected in the sediments (Tables 15 and 16). Several factors possibly contributed to this observation. First, an aufwuchs community separated the sediments from the water phase and may have decreased the transport of methyl parathion to the sediments. Additionally, the aufwuchs community degraded methyl parathion, further decreasing the probability of its reaching the sediments in measureable quantities ("Aufwuchs" section). Thirdly, the microbial community associated with sediments may have degraded methyl parathion as rapidly as it entered the sediments so that none was detected by gas chromatographic analysis. No attempt was made, however, to measure microbial second-order rate coefficients from the sediments.

Sediments did not obviously affect the fate of methyl parathion in the water phase. In CSTRs 5 through 8, designed to enrich for heterotrophic populations, approximately 20% of the incoming methyl parathion was lost in each CSTR. CSTRs 6 and 7 contained sediments, CSTRs 5 and 8 did not (data from Experiment 2, Figure 9).

Few statistical differences were observed in the biological parameters between Gibbsite-sand and Oconee River sediments (Tables 17 through 19). Chlorophyll a levels were similar for both sediments, with 1 of 4 comparisons significantly different ($\alpha = 0.05$). ATP levels were statistically undistinguishable ($\alpha = 0.05$), and bacteria were significantly higher ($\alpha = 0.05$) in Gibbsite sand than in Oconee River sediments only in Experiment 2; however, in Experiment 1, the aufwuchs mat was incorporated into the two types of sediments for analysis, probably masking existing differences. The high bacterial population associated with Gibbsite-sand may be caused by a lack of grazers.

Although the AFDW values were significantly different for the two sediments (Table 17), these differences reflect the chemical nature of Gibbsite.

Table 15. Summary of Shallow Gibbsite-Sand Sediments and Shallow Oconee River Sediments. $\bar{x} \pm s_x$ (n)[1].

Parameter[2]	Experiment 1		Experiment 2	
	Gibbsite-Sand	Oconee	Gibbsite Sand	Oconee
Bacteria/g	$4.5\times10^6 \pm 6.6\times10^5$(7)	$4.7\times10^6 \pm 1.2\times10^6$(8)	$4.4\times10^6 \pm 3.2\times10^5$(8)	$6.9\times10^5 \pm 1.7\times10^5$(8)
Chlorophyll a μg/g	19.6±3.8(8)	22.9±3.8(8)	1.5±.3(8)	0.7±0.2(8)
ATP, ng/g	475±149(8)	390±158(8)	484±149(8)	216±48(8)
AFDW, mg/g	51.01±5.48(8)	24.25±4.13(8)	45.34±2.76(8)	8.01±0.52(8)
Methyl Parathion ng/g	Not detected[3]	Not detected[3]	Not detected[3]	Not detected[3]

[1] Average of Channels A and B for 20 February 1979, 27 March 1979, and 10 April 1979 (Experiment 1); 24 July 1979, 7 August 1979, and 21 August 1979 (Experiment 2).

[2] All data represented in units per gram dry weight of sediments

[3] Methyl parathion below level of detection (10 ng/g)

Table 16. Summary of Deep Gibbsite-Sand Sediments and Deep Oconee River Sediments. $\bar{x} \pm s_x$ (n)[1].

Parameter[2]	Experiment 1		Experiment 2	
	Gibbsite-Sand	Oconee	Gibbsite Sand	Oconee
Bacteria/g	$2.5\times10^6 \pm 3.8\times10^5$(8)	$3.1\times10^6 \pm 1.4\times10^6$(8)	$3.0\times10^6 \pm 3.2\times10^5$(8)	$3.9\times10^5 \pm 7.1\times10^4$(8)
Chlorophyll a μg/g	10.0 ± 1.7(8)	10.3 ± 1.6(8)	$0.5 \pm .1$(8)	0.4 ± 0.1(8)
ATP, ng/g	111 ± 19(8)	245 ± 95(8)	208 ± 68(8)	123 ± 19(8)
AFDW, mg/g	62.81 ± 1.96(8)	15.56 ± 1.27(8)	52.83 ± 6.89(8)	10.76 ± 1.93(8)
Methyl Parathion ng/g	Not detected[3]	Not detected[3]	Not detected[3]	Not detected[3]

[1] Average of Channels A and B for 20 February 1979, 27 March 1979, and 10 April 1979 (Experiment 1); 24 July 1979, 7 August 1979, and 21 August 1979 (Experiment 2).

[2] All data represented in units per gram dry weight of sediments

[3] Methyl parathion below level of detection (10 ng/g)

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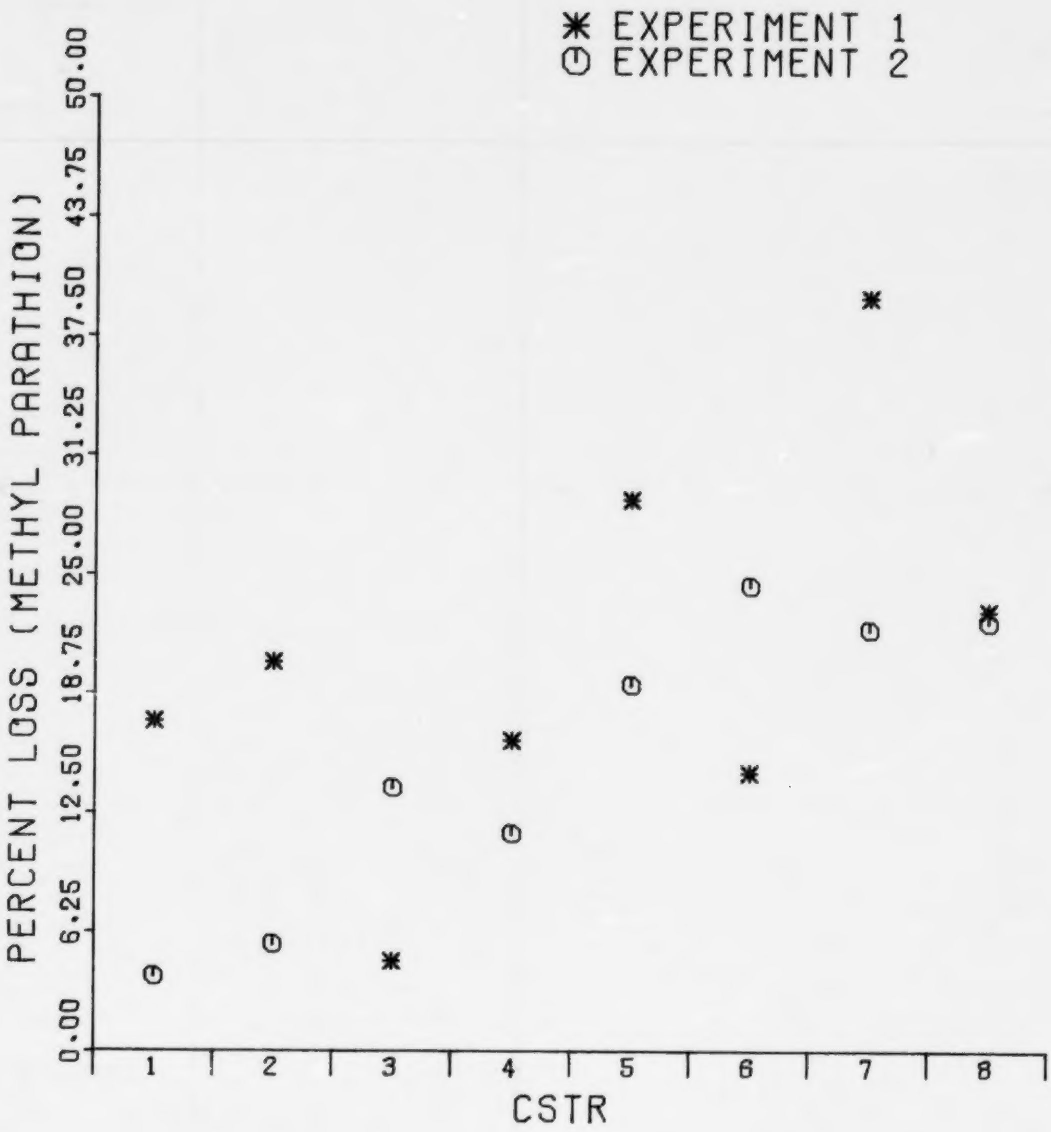

Figure 9. Percent Loss of Methyl Parathion in Experiment 1 and 2.

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Table 17. Student's t Values (t,DF) Comparing Gibbsite-Sand Sediment to Oconee River Sediment Concentrations of Bacteria, Chlorophyll a, ATP, and AFDW. Critical Values of t: 2.16, DF = 13; 2.14, DF = 14; ($\alpha = 0.05$).

Parameter	Experiment 1		Experiment 2	
	Shallow	Deep	Shallow	Deep
Bacteria	0.14(13)	0.47(14)	10.22(14)	7.64(13)
Chlorophyll a	0.61(14)	0.13(14)	2.02(14)	2.36(14)
ATP	0.39(14)	1.39(14)	1.71(14)	1.20(14)
AFDW	3.90(14)	20.36(14)	13.30(14)	5.88(14)

Table 18. Ratios of Chlorophyll a to Phaeophytin a.

	Experiment 1[a]		Experiment 2[b]	
	Gibbsite-Sand	Oconee	Gibbsite-Sand	Oconee
Mean	0.80	0.55	1.81	0.46
S.D.	1.08	0.27	0.55	0.23
N	12	12	16	16
t, D.F.	0.78, D.F. = 22		t = 9.06, D.F. = 30	
Critical value of t ($\alpha = .05$)	2.07		2.04	

[a] Average values of shallow and deep sediments for 3/27/79 and 4/10/79

[b] Average values of shallow and deep sediments for 7/24/79, 8/7/79, and 8/21/79

Table 19. Student's *t* Values (t,DF) Comparing Shallow and Deep Sediment Sediment Concentrations of Bacteria, Chlorophyll *a*, ATP, and AFDW. Critical Values of t: 2.16, DF = 13; 2.14, DF = 14; ($\alpha = 0.05$).

Parameter	Experiment 1		Experiment 2	
	Gibbsite-Sand	Oconee	Gibbsite-Sand	Oconee
Bacteria	2.72(13)	0.87(14)	3.03(14)	1.56(13)
Chlorophyll *a*	2.29(14)	3.05(14)	2.77(14)	1.71(14)
ATP	2.42(14)	0.78(14)	1.69(14)	1.78(14)
AFDW	2.03(14)	1.01(14)	2.01(14)	1.38(14)

Gibbsite ($Al(OH)_3$), a hydrate of alumina, undergoes dehydration when heated above 320°C (Zussman, 1967). Carbon analysis (Table 14) showed that Gibbsite-sand contained no organic carbon.

Ratios of chlorophyll a to phaeophytin a were higher for Gibbsite-sand sediments than for Oconee River sediments (Table 18); however, the difference is significant only in Experiment 2, during which the associated aufwuchs mat was removed prior to analysis. High concentrations of phaeophytin a relative to chlorophyll a have been used to indicate algal communities with low photosynthetic activity (Weber, 1973) or poor physiological condition (APHA, 1976). Such relationships have been found in anaerobic sediments (Yentsch and Menzel, 1963) and copepod fecal pellets (Holm-Hansen et al., 1965); furthermore, Holm-Hansen et al., (1965) suggest that such a relationship is indicative of grazing by zooplankton. Although the concentration of phaeophytin a in the Oconee River sediment during the experiments remained at approximately the concentration at which it was introduced (Table 19), the chlorophyll a/phaeophytin a ratio increased from 0.27 at the time of sediment introduction (Table 14) to 0.46 (Table 18), showing that the proportion of healthy algae in the sediments was increasing during the study.

SUMMARY

Although it was postulated that shallow sediments would have characteristics different from deep sediments, generally there were few major differences between the two sediments. Specific comparisons of shallow and deep sediments (Table 19) showed:

- that for Oconee sediments, only the chlorophyll a (Experiment 1) of the shallow sediments differed from the deep sediments; the bacteria (Experiments 1 and 2), ATP (Experiments 1 and 2), AFDW (Experiments 1 and 2), and chlorophyll a (Experiment 2) concentrations were similar for both shallow and deep sediments.

- that for Gibbsite-sand sediments, bacteria (Experiments 1 and 2) chlorophyll a (Experiments 1 and 2), and ATP (Experiment 1 only) levels were higher in shallow than deep sediments.

- methyl parathion was not detected in either the shallow or deep sediments (Tables 15 and 16). The aufwuchs probably prevented transport of methyl parathion to the sediments.

SECTION 7

AUFWUCHS

INTRODUCTION

Use of the term "aufwuchs" is based on Ruttner's (1963) definition: "all organisms that are firmly attached to a substrate but do not penetrate into it" as well as the "various forms living free within the mat of sessile forms." In the following discussion the autotrophic component of the aufwuchs will refer to algae while the heterotrophic community will include bacteria, nonpigmented protozoans, and microinvertebrates associated within the algal mat. During recent experimentation utilizing channel microcosms, the aufwuchs in each compartment was investigated to determine (1) the effects of differing nutrient treatments and sediment substrates on the taxonomic composition and biomass production of the autotrophic and heterotrophic components of the community, and (2) the fate of methyl parathion during steady-state conditions.

During both methyl parathion studies, inorganic nutrients were introduced into CSTR 3 of both channels while an organic carbon source was added to CSTR 5. These differing inorganic and organic nutrient treatments were established to enhance autotrophic community development in CSTRs 3 and 4 and heterotrophic community development in CSTR 5, and in the downstream compartments. The aufwuchs in these compartments was statistically evaluated to determine the effects of organic and inorganic nutrient additions on the autotrophic and heterotrophic communities. Clark et al. (1979) conducted similar studies based upon the additions of sucrose and dextrose to aquatic microcosms. The addition of sucrose stimulated the growth of bacteria in these microcosms, with no apparent inhibition of algal density, while the addition of dextrose had no consistent effect on either bacterial or algal biomass.

At the initiation of each experiment, an inorganic and an organic sediment substrate was introduced into CSTRs 6 and 7, respectively; and the influence of the different sediment types on aufwuchs development was subsequently evaluated. Giddings and Eddlemon (1977) examined the development of static microcosms that contained lake sediment or Ottawa sand substrates and found that substrate type greatly influenced algal biomass. The effect of substrate on algal production was less significant in their larger microcosms, however, and it was suggested that the smaller sediment surface area to volume ratio of these microcosms may have lessened any measurable effect.

The aufwuchs was further examined to determine the concentration of methyl parathion during periods of steady-state and to evaluate the transformation rate of methyl parathion. Subsidiary experiments were conducted to investigate the rate of transformation of methyl parathion by the bacterial community in the aufwuchs.

MATERIALS AND METHODS

During both experiments, sampling of aufwuchs was facilitated using teflon-covered plastic strips that were suspended along both sides of each CSTR at the time of system inoculation. Associated biota were sampled by scraping a measured area of a strip, were blended for 30 seconds, and aliquots were dispensed for algal identification and enumeration, as well as determination of TOC content, total microbial ATP concentration, chlorophyll a content, ash-free dry weight, toxicant concentration, and bacterial biomass. The aufwuchs was similarly sampled during the second experiment except a separate teflon-covered strip was sampled for analysis of toxicant concentration.

Biological Analyses

During both experiments, ash-free dry weight determination of aufwuchs was accomplished using the procedure outlined for periphyton (APHA, 1976). Ash-free dry weight of the aufwuchs was expressed as milligrams per square centimeter of the surface area sampled.

During both experiments, total organic carbon content of the aufwuchs samples was determined directly using a Beckman 915 TOC analyzer. The method used was based upon the organic carbon combustion - infrared method outlined in the APHA Standard Methods Manual (1976). Total organic carbon concentration was expressed as milligrams per square centimeter of the surface area sampled.

Samples of the aufwuchs algae were characterized by identification and enumeration methods similar to those used for suspended community samples. Samples of the aufwuchs slurry fixed with merthiolate preservative (Weber, 1968) were diluted, however, and a known volume was settled onto sedimentation slides for enumeration. Results were reported as algal cells per square centimeter of surface area sampled. During the second experiment, characterization of the suspended and aufwuchs algae was accomplished based on the relative frequency of occurrence (McIntire, 1968) of algal genera. Samples of fixed and stained aufwuchs were diluted and a known volume settled onto a sedimentation slide. Generic identification and frequency of occurrence was reported.

During both experiments, estimation of bacterial biomass was based upon enumeration via standard plate counts (APHA, 1976). Results were expressed as colony forming units (CFU) per square centimeter of the surface area sampled.

Total microbial biomass was estimated by analysis of the ATP (adenosine triphosphate) content of cell extracts. During the first experiment, the method for extraction and analysis of aufwuchs was based upon the boiling tris buffer [tris (hydroxymethyl)amino methane] procedure for plankton (APHA, 1976). During the second experiment, extraction of ATP from aufwuchs samples was based on the method of Bancroft et al. (1976), using sodium bicarbonate as the extractant. Results were expressed as nanograms per square centimeter of the surface area sampled.

During both experiments, analyses of the protozoan and microinvertebrate communities were limited to qualitative observations of fresh and preserved samples.

During both experiments algal biomass of the aufwuchs was determined by fluorometric measurement of chlorophyll a content corrected for phaeophytin a (Strickland and Parsons, 1968). During the first experiment, extraction of aufwuchs samples was based on the APHA (1976) procedure for periphyton. Samples were then processed as described in Section 5. During the second experiment the aufwuchs sample was extracted directly without filtration using a B Braun Cell Homogenizer as described in Section 5. The results of aufwuchs chlorophyll a analyses during both experiments were reported as micrograms per square centimeter of the surface area sampled.

Methyl Parathion

During the first experiment, the procedure used for extraction of methyl parathion from the aufwuchs samples was similar to that used for the extraction of suspended community samples (extraction efficiency = 98%). Sample extracts were analyzed on a Tracor MT-222Q GC equipped with a Hall detector, utilizing the nitrogen mode. During the second experiment, aufwuchs associated with a teflon-covered plastic strip was scraped, methylene chloride was added, and then the sample was extracted directly with a Brinkmann Polytron high-speed (30,000 rpm) blender. The resultant slurry was centrifuged for 10 minutes at 8500 rpm and the methylene chloride fraction removed for analysis (Payne et al., 1974). Sample extracts were analyzed on the Tracor MT-222Q GC with the Hall detector and periodic checks were made on the Tracor N-P detector and the ^{63}Ni electron capture detector. Results were expressed as nanograms per square centimeter of the surface area sampled.

Statistical Analyses

Evaluation of the aufwuchs biomass estimates and community composition in each CSTR was accomplished through analysis of covariance of log-transformed data [$\log_{10}(x + 1)$] and Duncan's New Multiple Range tests to summarize significant differences ($\alpha = 0.05$). Student's t-tests were performed on algal division densities to determine differences in community composition.

Second-Order Transformation Rate Studies

Subsidiary studies designed to determine the second-order transformation rate coefficients of methyl parathion were accomplished during both experiments. Known concentrations of the toxicant were incubated with aufwuchs samples and the transformation rate of methyl parathion was calculated. Aufwuchs samples from each compartment were blended and diluted to 150 ml with water from the same CSTR. The samples were incubated with a known concentration of methyl parathion (150 μg/l) at 20°C in the dark, for 24 hours (D.L. Lewis, USEPA, pers. comm.). Samples were collected at the initiation of experimentation and at 1.5, 3.0, 6.0, 12.0 and 24.0 hour increments and then extracted with iso-octane (Lewis et al., 1975). Quantitative determinations of methyl parathion in the aufwuchs were based upon procedures outlined in Paris and Lewis (1974) and Lewis et al. (1975). Autoclaved aufwuchs samples were analyzed for loss due to photolysis, sorption, and volatilization. During the initial study of transformation rates, estimates of bacterial biomass were based upon standard plate counts (APHA, 1976) of the aufwuchs, conducted as part of the investigation of methyl parathion fate in the channel microcosms. Bacterial biomass was expressed as cells per milligram of ash-free dry weight of the blended aufwuchs samples. During subsequent transformation rate studies, bacterial biomass was estimated directly from each aufwuchs incubation flask using standard plate counts. Microbial transformation rate coefficients of methyl parathion were calculated according to the following equation modified from Baughman et al. (1980).

$$k_1 = - \frac{d \ln[S]}{dt} \qquad\qquad k_b = \frac{k_1}{[B]}$$

where: [S] = difference in methyl parathion concentration at time, t, from initial methyl parathion concentration

B = bacterial biomass

k_1 = first order methyl parathion transformation rate coefficient

k_b = second-order methyl parathion transformation rate coefficient

RESULTS AND DISCUSSION

Aufwuch Community Characterization

Aufwuchs developed extensive mats along the walls and paddlewheels of each compartment within a few weeks after inoculation with biota from local bodies of water. In order to describe the algal community, three sampling dates were chosen from each experiment. During the initial methyl parathion study, observations of artificial substrates colonized for periods ranging from 8 to 15 weeks revealed a total of 32 algal genera, with the majority of taxa representative of the Chlorophyta. Total algal cell densities ranged from 9.1×10^6 to 2.7×10^7 cells/cm^2 (Table 20). Genera of the Chlorophyta and Cyanophyta achieved densities ranging from 4.0×10^6 to 2.0×10^7 and 4.8×10^6 to 1.5×10^7 cells/cm^2 respectively, while the Chrysophyta achieved densities that varied from 9.4×10^4 to 4.8×10^5 cell/cm^2. As was observed in the suspended algal populations, members of the Cyanophyta and Chlorophyta were observed to share dominance in each CSTR on the basis of similar cell densities (Table 20); however, the Chlorophyta was observed to dominate each compartment based upon the diversity of taxa

Table 20. Algal Diversity[1] and Mean Density[2] - Experiment 1, Aufwuchs.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta	$6.5\text{x}10^{6}$(4)	$5.6\text{x}10^{6}$(2)	$7.0\text{x}10^{6}$(4)	$5.0\text{x}10^{6}$(3)	$5.0\text{x}10^{6}$(6)	$1.5\text{x}10^{7}$(4)
Chlorophyta	$2.0\text{x}10^{7}$(12)	$9.6\text{x}10^{6}$(8)	$7.6\text{x}10^{6}$(16)	$4.0\text{x}10^{6}$(11)	$9.0\text{x}10^{6}$(15)	$5.0\text{x}10^{6}$(11)
Chrysophyta	$3.1\text{x}10^{5}$(8)	$9.4\text{x}10^{4}$(2)	$4.4\text{x}10^{5}$(4)	$1.3\text{x}10^{5}$(7)	$4.8\text{x}10^{5}$(6)	$4.3\text{x}10^{5}$(6)
Total	$2.7\text{x}10^{7}$(24)	$1.5\text{x}10^{7}$(12)	$1.5\text{x}10^{7}$(24)	$9.1\text{x}10^{6}$(21)	$1.4\text{x}10^{7}$(27)	$2.0\text{x}10^{7}$(21)

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[1] Parentheses indicate diversity-expressed as total genera observed

[2] Density expressed as cells/cm^2; means based upon sampling dates: 2/20/79, 3/27/79, 4/10/79

reported. Total algal diversity ranged from 12 to 27 taxa among the various compartments, with the highest number of taxa recorded from CSTR 7 in which the Cyanophyta, Chlorophyta, and Chrysophyta composed 6, 15, and 6 genera, respectively. Scenedesmus, Stigeoclonium, and Oedogonium of the division Chlorophyta and Oscillatoria and Microcystis of the Cyanophyta were the dominant genera in the aufwuchs (Table 21), based upon densities that represented 10% or more of the mean total density. The contribution of the above five genera to the mean total densities reported for each compartment during the initial investigation varied from 56 to 98%; however, these observations of dominance do not take into consideration the differences among biovolumes of the various genera recorded.

During the second methyl parathion experiment, analyses of the aufwuchs algae revealed the presence of 22 algal genera comprising four divisions: Cyanophyta, Chlorophyta, Chrysophyta, and Cryptophyta. Little difference was noted among the algal communities of the various CSTRs based upon total algal diversity, which ranged from 14 to 18 taxa (Table 22). The diversity of each algal division did not vary by more than two genera among the six compartments. Oscillatoria, Lyngbya, and Phormidium of the division Cyanophyta; Chlamydomonas, Stigeoclonium, Scenedesmus, and Ankistrodesmus of the Chlorophyta; and Nitzschia, Synedra, and Gomphonema of the Chrysophyta were the dominant taxa (Table 23) based upon occurrence in $>$50% of the total fields of view (McIntire, 1968). Taxonomic evaluation of algal communities, sampled on August 21, 1979, revealed a total of 41 species of aufwuchs algae (Appendix B, Table B83).

During the first experiment, estimates of bacterial biomass associated with the algal mat ranged from 6.3×10^5 colony forming units (CFU)/cm^2 of surface area samples to 8.9×10^6 CFU/cm^2 of surface area (Appendix B, Tables B60 and B61). During the second experiment, bacterial biomass estimates were approximately one order of magnitude higher than bacterial biomass during the first experiment. Bacterial biomass ranged from 2.2×10^6 CFU/cm^2 of aufwuchs surface area to 8.1×10^7 CFU/cm^2 of surface area sampled (Appendix B, Tables B60 and B61).

Structural Differences in Aufwuchs Communities

During both methyl parathion investigations, biomass estimates of the aufwuchs were statistically analyzed to evaluate the effect of different organic and inorganic nutrient regimes on community development. Inorganic nutrients were introduced into CSTR 3 in an attempt to stimulate autotrophic development in both CSTRs 3 and 4; glycerol was added to CSTR 5 in order to enhance the development of heterotrophic communities in the remaining compartments (CSTRs 5 through 8). Statistical tests were performed on the mean biomass estimates of all compartments to evaluate the effects of the different nutrient additions on community development. During the initial study, significant differences were observed in the mean concentrations of cellular ATP with higher values reported for CSTRs 3 and 4 (Table 24). Although no quantitative evaluations were conducted on the microfauna during the initial investigation, protozoans, rotifers, copepods and other microinvertebrates were noted in both fresh and preserved samples. The higher ATP concentrations could have resulted from a more abundant microfaunal community in

Table 21. Relative Density of Dominant Algae[1,2] - Experiment 1, Aufwuchs.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Chlorophyta						
Scenedesmus	45	61	30	30	17	16
Stigeoclonium				11	15	
Oedogonium					13	
Cyanophyta						
Oscillatoria	14	28	19	30		
Microcystis		9	7	20	13	70
Total	59	98	56	91	58	86
Mean Total Density (cells/cm^2)	2.7×10^7	1.5×10^7	1.5×10^7	9.1×10^6	1.4×10^7	2.0×10^7

[1] Relative density expressed as the % of mean total density, sampling dates: 2/20/79, 3/27/79, 4/10/79

[2] Dominance is based on mean generic density of >10% of mean total density, Subdominance: 5 to 10%

Table 22. Algal Diversity[1] - Experiment 2, Aufwuchs.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta	4	5	4	5	5	5
Chlorophyta	6	8	6	6	7	6
Chrysophyta	3	3	5	4	5	5
Cryptophyta	1	1	1	1	1	1
Total	14	17	16	16	18	17

[1] Diversity expressed as total genera observed, sampling dates: 7/24/79, 8/7/79, 8/21/79.

Table 23. Relative Frequency of Occurrence[1] of Dominant and Subdominant Algae[2] - Experiment 2, Aufwuchs.

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta						
Oscillatoria	30	81	78	86	90	88
Chroococcus	28	13	15	20	19	15
Phormidium	43	23	53	33	30	28
Chlorophyta						
Chlamydomonas	90	73	68	44	36	33
Stigeoclonium	68	40	53	42	33	39
Scenedesmus	23	30	35	35	69	67
Ankistrodesmus			14	3	32	13
Chrysophyta						
Nitzschia	29	35	22	31	26	18
Synedra	52	41	34	40	28	29
Gomphonema	6	1	20	36	20	38

[1] Expressed as a percentage of the fields of view in which a particular genus occurred (McIntire, 1968) based on 120 fields from 6 samples, sampling dates: 7/24/79, 8/7/79, 8/21/79.

[2] Dominance is based on occurrence in >50% of the total fields of view (McIntire, 1968) observed in 6 samples, Subdominance: 25 to 50%

Table 24. Duncan's New Multiple Range Test of Bacteria, Algae, Chlorophyll a, ATP, and Ash-Free Dry Weight[1], Aufwuchs. ($\alpha = 0.05$).

Parameter	Experiment 1						Experiment 2					
Bacteria												
CSTR	5	3	4	6	7	8	3	5	4	6	7	8
Mean	6.552	6.538	6.486	6.398	6.354	6.150	7.278	7.205	7.178	7.020	6.950	6.843
Grouping	—	—	—	—	—	—		—	—	—		
							—	—	—	—	—	—
Algae												
CSTR	3	8	4	7	5	6	No Data					
Mean	7.15	7.07	7.01	6.99	6.86	6.86						
Grouping	—	—	—	—	—	—						
Chlorophyll a												
CSTR	3	4	5	6	7	8	3	4	5	7	8	6
Mean	0.814	0.752	0.730	0.684	0.608	0.584	0.902	0.881	0.805	0.721	0.609	0.583
Grouping	—	—	—	—	—	—	—	—	—	—	—	—
ATP												
CSTR	4	3	5	6	7	8	4	3	7	5	8	6
Mean	2.614	2.598	2.042	1.796	1.564	1.238	2.918	2.865	2.675	2.570	2.365	2.358
Grouping					—	—			—	—	—	—
				—	—		—	—	—	—		
	—	—	—	—								
AFDW												
CSTR	3	4	6	5	7	8	5	3	7	4	6	8
Mean	1.291	1.218	1.215	1.028	1.028	0.978	4.238	3.187	2.842	2.728	2.176	1.881
Grouping	—	—	—	—	—	—			—	—	—	—
								—	—	—	—	
							—					

[1] $\text{logarithm}_{10}(x + 1)$

CSTRs 3 and 4 than in the downstream compartments. However, ash-free dry weight and TOC data reported during these experiments do not support this hypothesis (Table 24). In a similar study, Clark et al. (1979) found no consistent stimulatory effect on the bacterial population when dextrose was added as an organic carbon source to enhance the growth of the heterotrophic community in channel microcosms. Although cellular ATP and chlorophyll a concentrations decreased or remained the same in the streams with dextrose addition, dry weight and ash-free dry weight values increased in the same streams.

During the second experiment, significant differences were observed in the bacterial biomass, ATP, and ash-free dry weight values and appeared to be related to the nutrient treatments. Although the differences were not consistent between parameters, bacterial biomass estimates were higher in CSTRs 3 through 5 and were grouped separately from CSTRs 6 through 8 (Table 24). Ash-free dry weight values were higher in CSTRs 3 and 5 than the remaining compartments, whereas ATP concentrations were higher in CSTRs 3 and 4 as compared to CSTRs 6 and 8 (Table 24). Generally, the higher values of biomass observed in the upstream compartments (CSTRs 3 through 5) appear to be the result of higher densities of bacterial biomass in these compartments rather than algal biomass because an examination of chlorophyll a concentrations revealed no significant differences between compartments (Table 24).

The addition of inorganic nutrients to CSTR 3 and organic nutrients to CSTR 5 did not significantly ($\alpha = 0.05$) affect the total algal densities achieved during the initial experiment (Table 24). Also, densities achieved by to the Chlorophyta never differed significantly ($\alpha = 0.05$) from those achieved by the Cyanophyta in the same CSTR (Table 25), consequently each compartment was observed to be mutually dominated by these two divisions.

During the initial experimentation, algal diversity varied from 21 to 27 genera with the exception of CSTR 4, which only supported a total of 12 taxa (Table 20). During the second investigation the algal diversity ranged from 14 to 18 genera (Table 22). During both studies of the fate of methyl parathion, at least 50% of the dominant algal taxa were observed under conditions established to stimulate heterotrophic as well as autotrophic populations (Tables 21 and 23). No clear indication of either enhanced autotrophic or heterotrophic community development was evident based upon estimates of total algal density, the occurrence of dominant algal taxa, or the diversity achieved by the aufwuchs algae. During the first experiment, however, the Chlorophyta increased in density in CSTRs 3 and 4 resulting in a different algal community composition in the compartments designed to stimulate autotrophic populations.

During both methyl parathion investigations, sediment substrates were introduced into CSTRs 6 and 7 to examine their influence on the fate of methyl parathion in the channel microcosms. CSTR 6 received an inorganic sediment substrate and an organic sediment substrate was placed in CSTR 7. The aufwuchs biomass estimates were statistically examined to evaluate the effect of the different substrates on microbial biomass and algal density in these compartments.

Table 25. Student's *t* Test Values of Algal Division Density Comparisons - Experiment 1, Aufwuchs[1].

	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Cyanophyta to Chlorophyta	2.06(5)	1.36(10)	0.19(10)	0.41(5)	1.34(10)	1.19(5)

[1] df in parentheses; means based upon sampling dates: 2/20/79, 3/27/79, 4/10/79; Channels A and B combined

Critical t = 2.571 at df 5; 2.228 at df 10; $\alpha = 0.05$

Duncan's New Multiple Range Tests of the biomass estimates from the initial study demonstrated no significant difference ($\alpha = 0.05$) in the mean values of algal density nor in estimates of bacterial and total microbial biomass in CSTRs 6 and 7 (Table 24). The sediment surface area to volume ratios in CSTRs 6 and 7 were smaller (3.9 m^2, 250 liters) than the ratios of sediment surface area to volume (1.8 m^2, 70 liters) in the larger microcosms studied by Giddings and Eddlemon (1977). As was suggested by these workers, small sediment surface area to volume ratios may eliminate any measurable influence of sediment type on algal density and microbial biomass.

Although no significant differences were reported during Experiment 1 for the total algal densities nor the chlorophyll *a* concentrations of the aufwuchs in CSTRs 6 and 7 (Table 24), a significant difference in the numbers of chlorophytes ($\alpha = 0.05$) was observed in CSTR 7 (Table 20). The higher mean density of the Chlorophyta was apparently at the expense of decreased populations of Cyanophyta and Chrysophyta because the total standing crop of algae did not differ between the two compartments. The genus *Oedogonium* was one of three dominant members of the Chlorophyta in CSTR 7, but was not observed in CSTR 6; additionally, the cyanophyte, *Oscillatoria*, was a dominant genus in CSTR 6; however, it was not reported from CSTR 7. Other differences in the composition of the two algal communities were a higher taxonomic diversity (27 genera) achieved in CSTR 7 (Table 20) and a lower relative density (58%) contributed by the four dominant taxa in CSTR 7 (Table 21). The dominant genera in CSTR 6 accounted for 91% of the total density.

Statistical comparisons of the biomass estimates recorded from CSTRs 6 and 7 during the second methyl parathion investigation (Table 24) indicated no significant differences between these two compartments. Although algal density was not estimated, the algal diversity in CSTRs 6 and 7 was very similar with a total of 18 genera observed in CSTR 7 and 16 genera observed in CSTR 6. Evaluation of the relative frequency of occurrence of dominant genera revealed different algal communities in the two compartments. *Gomphonema*, *Synedra*, *Stigeoclonium*, and *Chlamydomonas* were observed more frequently in CSTR 6, whereas *Ankistrodesmus*, *Scenedesmus* and *Cosmarium* were observed to occur more often in CSTR 7 (Table 23). Thus, total algal density in the aufwuchs showed no variation attributable to the differing sediment substrates in CSTRs 6 and 7; however, the generic composition of the algae was affected.

During both experiments, methyl parathion was introduced into Compartment 1 of Channel A and B. After undergoing photolytic and chemical hydrolytic transformations in CSTRs 1 and 2, respectively, the remaining parent compound flowed into each successive compartment to undergo further transformation by the microbial community. Samples from artificial substrates were analyzed to determine the concentration of methyl parathion associated with the aufwuchs in each CSTR.

During the first investigation, methyl parathion concentrations of the aufwuchs generally decreased in each successive CSTR with the largest difference exhibited when CSTRs 3 and 4 were compared to the downstream CSTRs

(Table 26). Statistical evaluation of bacterial biomass estimates, however, demonstrated no significant differences between these groups of compartments (Table 24).

Methyl parathion concentrations during the second experiment decreased in each successive CSTR. Duncan's New Multiple Range tests grouped CSTR 3 and CSTR 8 alone and grouped CSTRs 4 and 5 together and CSTRs 6 and 7 together (Table 26). Evaluation of the mean bacterial biomass revealed significant differences between CSTRs 3 through 5 and CSTRs 5 through 8, which indicates that during the second experiment disappearance of methyl parathion from the aufwuchs appeared to be related to bacterial biomass in the aufwuchs.

In order to evaluate the microbial second order transformation rate of methyl parathion, laboratory experiments were conducted during the investigations of methyl parathion fate in channel microcosms, utilizing the aufwuchs from each CSTR. The transformation rate coefficients calculated for the bacterial community of the aufwuchs generally varied widely between CSTRs in each of the three laboratory experiments as well as between the experiments (Tables 27 and 28). Methyl parathion transformation coefficients generally increased in each successive CSTR with the coefficients of CSTRs 6 through 8 being several times higher than the coefficients calculated for CSTRs 3 through 5. The mean transformation coefficients calculated for the three laboratory experiments varied by approximately one order of magnitude between experiments, but the coefficients from various CSTRs differed to a lesser extent. During the initial rate experiment, the mean value of the 4 communities was 3.2×10^{-8} ml/cell/hr, whereas the mean values for the 12 communities examined in each of the subsequent experiments were 5.0×10^{-9} ml/cell/hr and 3.0×10^{-10} ml/cell/hr. Other processes measured, such as photolysis, hydrolysis, and volatilization, were negligible as compared to microbial degradation processes.

Investigations conducted by D. Paris, USEPA (pers. comm.), indicated that second order rate coefficients for methyl parathion were relatively stable, but these findings are not supported by the results presented here (Tables 27 and 28). Variation in the data from the initial rate experiment appeared to be due to changes in bacterial biomass in each CSTR rather than to changes in the first order transformation rate. During the initial rate experiment, the second order transformation coefficients were extrapolated from the mean estimates of bacterial biomass from all the CSTRs of the channel microcosms [$(3.5 \pm 0.46) \times 10^6$ bacteria/mg of ash-free dry weight], rather than from bacterial biomass estimates of each CSTR under investigation. During subsequent rate experiments, the second order rate coefficients were based upon bacterial biomass estimates of each CSTR under investigation. Wide variation in the mean values of second order rate coefficients, however, was still evident between subsequent experiments.

As discussed in recent studies by Spain et al. (1980), microbial transformation rates of a particular compound vary widely and may be indicative of changes in the proportion of specific degraders within the total microbial population. Spain et al. (1980) have shown that the proportion of the bacterial population able to transform para-nitrophenol increased by three

Table 26. Duncan's New Multiple Range Test for Mean Concentrations of Methyl Parathion, Aufwuchs. ($\alpha = 0.05$).

<table>
<tr><th>Parameter</th><th colspan="6">Experiment 1</th><th colspan="6">Experiment 2</th></tr>
<tr><td>Methyl Parathion</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CSTR</td><td>3</td><td>4</td><td>6</td><td>5</td><td>7</td><td>8</td><td>3</td><td>4</td><td>5</td><td>7</td><td>6</td><td>8</td></tr>
<tr><td>Mean</td><td>6.040</td><td>3.083</td><td>0.873</td><td>0.628</td><td>0.398</td><td>0.000</td><td>14.933</td><td>9.070</td><td>8.127</td><td>4.853</td><td>4.600</td><td>1.820</td></tr>
<tr><td>Grouping</td><td colspan="2">__________</td><td colspan="4">____________________</td><td>_____</td><td colspan="2">__________</td><td colspan="2">__________</td><td>_____</td></tr>
</table>

Table 27. Second Order Methyl Parathion Rate Coefficients - Experiment 1.

CSTR	Date	K_b(ml/cell/hr)
A3	4/17/79	$(1.6 \pm 0.25) \times 10^{-8}$(4)[a]
A5	4/10/79	$(2.3 \pm 1.30) \times 10^{-8}$(5)
B5	5/2/79	$(2.1 \pm 0.99) \times 10^{-8}$(2)
B8	5/2/79	$(7.5 \pm 0.81) \times 10^{-8}$(3)

[a] mean ± standard error; n in parentheses

Table 28. Second Order Methyl Parathion Transformation Rate Coefficients Experiment 2.

CSTR	K_b(ml/cell/hr)[a]	
	8-28-79	9-11-79
A3	$(3.3\pm0.30)\times10^{-10}$(2)	
A4	2.2×10^{-9}	
A5	$(1.2\pm0.99)\times10^{-9}$(2)	
A6	1.2×10^{-8}	
A7	9.1×10^{-9}	
A8	1.0×10^{-8}	
B3	2.6×10^{-9}	1.3×10^{-10}
B4	1.9×10^{-9}	3.7×10^{-10}
B5	$(6.4\pm0.10)\times10^{-9}$(2)	9.0×10^{-11}
B6	1.1×10^{-8}	6.2×10^{-10}
B7	1.1×10^{-8}	3.0×10^{-10}
B8	$(8.3\pm1.80)\times10^{-9}$(2)	2.8×10^{-10}

[a] mean ± standard error; n in parentheses

orders of magnitude over a period of 143 hours. These workers have stated that "the ability of the microbial population to adapt to rapidly degrade a compound may, in some cases, be an additional rate-determining factor" and furthermore, that the use of total bacterial biomass may underestimate the transformation rate coefficients.

The wide variation in second order transformation rate coefficients determined during evaluation of methyl parathion fate may be indicative of changes in the portion of active methyl parathion degraders within the total microbial community. A recent study by D. Lewis, USEPA (pers. comm.), has established several bacterial isolates capable of transforming methyl parathion.

SUMMARY

o Total algal cell densities of the aufwuchs during the first experiment ranged from 9.1×10^6 to 2.7×10^7 cells/cm^2. In both experiments members of the Cyanophyta and Chlorophyta were the dominant genera present. Aufwuchs bacterial biomass from the first and second experiments ranged from 6.3×10^5 CFU/cm^2 to 8.9×10^6 CFU/cm^2 and 2.2×10^6 CFU/cm^2 to 8.1×10^7 CFU/cm^2, respectively.

o Generally higher aufwuchs biomass values were observed in the compartments near the influent and may reflect high densities of those microheterotrophs other than bacteria not analyzed for.

o The inclusion of sediment substrates in selected CSTRs did not influence aufwuchs community composition or microbial biomass.

o No clear trends in methyl parathion degradation was apparent during the first experiment; however, disappearance of methyl parathion in the aufwuchs was related to the bacterial biomass of the aufwuchs during the second experiment.

o Transformation rate coefficients calculated for the bacterial community generally varied widely between CSTRs as well as between experiments; however, the mean rate coefficients between CSTRs varied to a lesser extent than the mean rate coefficients between each of the three experiments.

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TABLE B-1. AMMONIA NITROGEN (MG/L) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	.00	.00	1.00	.75	.30	.08	.00	.00
01/12/79	.00	.00	.80	.49	.15	.10	.10	.10
01/19/79	.00	.00	.91	.68	.28	.10	.05	.05
01/26/79	.00	.00	.97	.76	.25	.12	.12	.13
01/30/79	.00	.00	1.02	.88	.49	.36	.29	.24
02/02/79	.00	.00	1.00	.89	.38	.27	.25	.23
02/06/79	.00	.00	.94	.78	.28	.08	.02	.00
02/09/79	.00	.00	.95	.72	.25	.15	.10	.02
02/13/79	.00	.00	1.02	.85	.45	.48	.45	.32
02/16/79	.00	.00	1.00	.85	.46	.30	.30	.25
02/20/79	.00	.00	.99	.88	.35	.26	.22	.16
02/23/79	.00	.00	1.08	1.00	.55	.35	.45	.45
02/27/79	.00	.00	.85	.60	.20	.10	.18	.12
03/02/79	.00	.00	.80	.55	.15	.15	.20	.15
03/05/79	.00	.00	.80	.78	.68	.72	.85	.85
03/09/79	.00	.00	1.18	1.02	.65	.48	.32	.18
03/13/79	.02	.00	.92	.60	.28	.22	.22	.25
03/16/79	.02	.02	.85	.52	.30	.22	.22	.22
03/20/79	.00	.00	.75	.42	.18	.12	.15	.18
03/23/79	.00	.00	.80	.45	.08	.05	.15	.12
03/27/79	.00	.00	1.02	.62	.22	.08	.05	.08
03/30/79	.00	.00	1.00	.78	.42	.38	.32	.22
04/03/79	.00	.00	1.05	.78	.30	.22	.15	.10
04/06/79	.00	.00	1.10	.90	.48	.42	.35	.20
04/10/79	.02	.00	1.05	.72	.38	.22	.32	.32
04/13/79	.00	.00	.98	.65	.25	.18	.22	.15
04/17/79	.00	.00	.88	.45	.28	.05	.10	.08
04/20/79	.02	.02	1.25	1.10	.70	.45	.30	.20
04/24/79	.00	.00	.70	.32	.05	.08	.18	.20
04/27/79	.02	.02	1.22	1.10	.62	.42	.28	.12
05/01/79	.00	.00	.62	.20	.02	.10	.10	.20
06/05/79	.02	.02	.88	.95	.48	.50	.50	.52
06/08/79	.00	.00	1.00	.98	.80	.70	.62	.68
06/15/79	.00	.00	.75	.48	.15	.02	.02	.02
06/19/79	.02	.00	.72	.40	.10	.02	.02	.02
06/22/79	.02	.00	.85	.68	.38	.12	.02	.02
06/26/79	.02	.00	.95	.62	.40	.32	.32	.28
06/29/79	.02	.02	.98	.80	.50	.40	.38	.40
07/03/79	.02	.02	.95	.68	.28	.08	.05	.05
07/06/79	.02	.02	1.05	.92	.68	.45	.28	.18
07/10/79	.00	.00	1.05	.85	.28	.18	.12	.15
07/13/79	.02	.00	1.02	.78	.25	.20	.12	.08
07/17/79	.00	.00	.95	.72	.08	.08	.10	.08
07/20/79	.00	.00	.90	.70	.10	.08	.20	.12
07/24/79	.00	.00	.95	.75	.12	.12	.25	.25
07/27/79	.02	.00	.95	.88	.35	.20	.30	.25

(CONTINUED)

TABLE B-1. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/31/79	.02	.00	.92	.75	.08	.05	.12	.12
08/03/79	.00	.00	1.18	1.18	.58	.35	.30	.15
08/07/79	.02	.00	.95	.72	.10	.05	.15	.18
08/10/79	.02	.02	1.10	1.02	.48	.32	.28	.22
08/14/79	.00	.00	.98	.75	.35	.08	.08	.08
08/17/79	.00	.00	1.25	1.25	.78	.55	.38	.25
08/21/79	.02	.00	1.02	.80	.20	.08	.10	.15
08/24/79	.02	.00	1.28	1.40	.92	.75	.58	.35
08/28/79	.05	.02	1.20	1.22	.52	.25	.35	.38
08/31/79	.00	.00	1.42	1.42	.95	.58	.42	.28
09/04/79	.00	.00	.98	.98	.80	.95	1.25	1.52
09/07/79	.02	.02	1.10	.95	.60	.52	.62	.70
09/11/79	.00	.00	1.18	1.15	.82	.68	.50	.35
09/14/79	.05	.02	.90	.68	.38	.55	.98	1.20
09/18/79	.00	.00	1.02	.88	.75	.88	1.12	1.08
09/21/79	.02	.02	.98	.70	.32	.25	.35	.48
09/24/79	.02	.00	.95	.95	.78	.80	.78	.62

TABLE B-2. AMMONIA NITROGEN (MG/L) IN CHANNEL B AT 0800 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	.00	.00	.98	.72	.32	.18	.08	.05
01/12/79	.00	.00	.90	.59	.20	.10	.10	.10
01/19/79	.05	.02	.94	.72	.28	.05	.10	.10
01/26/79	.00	.00	.90	.78	.47	.30	.24	.20
01/30/79	.00	.00	.97	.90	.60	.60	.52	.45
02/02/79	.00	.00	.97	.85	.49	.48	.49	.48
02/06/79	.00	.00	.95	.70	.10	.02	.00	.00
02/09/79	.00	.00	.88	.75	.18	.05	.05	.02
02/13/79	.00	.00	.80	.72	.30	.10	.08	.02
02/16/79	.00	.00	.86	.66	.22	.06	.10	.02
02/20/79	.00	.00	.64	.37	.06	.02	.05	.02
02/23/79	.00	.00	.95	.78	.50	.35	.42	.38
02/27/79	.00	.00	.58	.38	.12	.10	.10	.05
03/02/79	.00	.00	.52	.32	.10	.15	.18	.05
03/05/79	.00	.00	.72	.50	.38	.52	.70	.75
03/09/79	.00	.00	.68	.40	.12	.12	.22	.10
03/13/79	.02	.00	.60	.32	.05	.18	.22	.18
03/16/79	.05	.02	.82	.65	.22	.32	.40	.32
03/20/79	.02	.00	.65	.40	.08	.22	.32	.35
03/23/79	.00	.00	.68	.40	.05	.22	.30	.32
03/27/79	.00	.00	.75	.40	.05	.05	.15	.20
03/30/79	.02	.02	1.05	.88	.65	.58	.42	.38
04/03/79	.02	.00	.65	.38	.05	.08	.08	.15
04/06/79	.00	.00	.98	.90	.62	.50	.35	.28
04/10/79	.00	.00	.75	.50	.18	.15	.18	.22
04/13/79	.00	.00	.68	.48	.25	.15	.15	.20
04/17/79	.02	.02	.58	.35	.05	.05	.08	.18
04/20/79	.02	.02	.72	.60	.32	.20	.18	.20
04/24/79	.02	.02	.58	.30	.05	.05	.02	.05
04/27/79	.02	.02	1.30	1.05	.58	.38	.25	.15
05/01/79	.00	.00	1.18	1.12	1.18	1.30	1.48	1.55
06/05/79	.02	.00	.90	1.00	.52	.60	.55	.55
06/08/79	.02	.00	1.02	1.05	.82	.82	.70	.78
06/15/79	.02	.00	.85	.65	.35	.18	.08	.05
06/19/79	.02	.00	.80	.58	.22	.02	.02	.02
06/22/79	.00	.00	1.08	1.02	.70	.52	.38	.15
06/26/79	.05	.02	.95	.80	.50	.52	.60	.70
06/29/79	.02	.02	.88	.78	.58	.52	.52	.55
07/03/79	.02	.02	.92	.72	.28	.10	.05	.05
07/06/79	.02	.02	1.02	1.00	.80	.55	.32	.12
07/10/79	.00	.02	.88	.88	.25	.10	.10	.25
07/13/79	.00	.00	.95	.95	.38	.28	.20	.12
07/17/79	.00	.02	.92	.85	.30	.20	.18	.12
07/20/79	.00	.05	1.00	.88	.30	.25	.22	.12
07/24/79	.02	.00	1.02	.90	.32	.25	.25	.20
07/27/79	.02	.02	1.02	.85	.40	.20	.25	.18

(CONTINUED)

TABLE B-2. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/31/79	.02	.02	.98	.65	.20	.05	.05	.05
08/03/79	.02	.00	1.05	1.00	.55	.65	.65	.40
08/07/79	.02	.00	.85	.68	.12	.12	.15	.12
08/10/79	.02	.00	1.08	1.05	.52	.52	.45	.25
08/14/79	.05	.05	.95	.80	.30	.18	.15	.10
08/17/79	.00	.00	1.10	1.12	.60	.62	.48	.28
08/21/79	.00	.00	.92	.70	.20	.12	.10	.10
08/24/79	.02	.00	1.28	1.35	.75	.68	.50	.32
08/28/79	.02	.02	.98	.85	.20	.12	.20	.40
08/31/79	.00	.00	1.20	1.10	.52	.55	.55	.42
09/04/79	.02	.02	1.45	1.65	1.62	1.90	2.15	2.30
09/07/79	.00	.00	1.15	1.00	.72	.92	1.15	1.40
09/11/79	.00	.00	1.25	1.28	1.20	1.38	1.60	1.60
09/14/79	.05	.05	1.05	.68	.52	.40	.52	.68
09/18/79	.00	.00	1.00	.75	.45	.32	.28	.25
09/21/79	.02	.02	1.08	.92	.58	.40	.38	.35
09/24/79	.08	.02	1.02	.90	.42	.35	.38	.42

TABLE B-3. AMMONIA NITROGEN (MG/L) IN CHANNEL A AT 1500 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	.00	.00	1.05	.82	.28	.10	.05	.05
01/09/79	.02	.02	.65	.35	.15	.05	.02	.02
01/16/79	.00	.00	.60	.34	.15	.11	.10	.10
01/23/79	.02	.00	.64	.50	.30	.28	.28	.32
01/25/79	.00	.00	.57	.42	.20	.18	.17	.18
01/29/79	.00	.00	.57	.47	.30	.25	.17	.15
02/01/79	.00	.00	.62	.48	.32	.30	.22	.23
02/05/79	.00	.02	.58	.38	.12	.08	.02	.02
02/08/79	.00	.00	.60	.35	.12	.12	.02	.02
02/12/79	.00	.00	.70	.58	.40	.32	.20	.15
02/15/79	.02	.00	.72	.55	.29	.22	.16	.25
02/19/79	.00	.00	.70	.54	.10	.08	.05	.09
02/22/79	.00	.00	1.02	1.02	.70	.55	.50	.38
02/26/79	.00	.00	.68	.40	.08	.02	.08	.08
03/01/79	.00	.00	.58	.35	.05	.02	.02	.02
03/08/79	.00	.00	1.02	.80	.20	.12	.12	.10
03/12/79	.02	.00	.68	.40	.12	.08	.18	.28
03/15/79	.02	.02	.58	.38	.10	.05	.05	.00
03/19/79	.02	.00	.45	.20	.02	.02	.02	.02
03/22/79	.00	.00	.45	.25	.05	.02	.02	.05
03/26/79	.00	.00	.65	.30	.08	.05	.02	.02
03/29/79	.00	.00	.72	.65	.22	.10	.08	.05
04/02/79	.02	.00	.90	.45	.08	.05	.05	.05
04/05/79	.02	.02	.92	.72	.30	.15	.05	.05
04/09/79	.02	.00	.82	.48	.22	.08	.12	.12
04/12/79	.02	.02	.68	.38	.10	.02	.02	.02
04/16/79	.02	.00	.62	.25	.05	.05	.05	.05
04/19/79	.02	.00	1.00	.80	.20	.02	.00	.05
04/23/79	.02	.00	.50	.18	.10	.08	.12	.12
04/26/79	.00	.00	.98	.78	.20	.12	.10	.05
06/04/79	.02	.02	1.02	1.02	.42	.48	.48	.55
06/07/79	.05	.00	.90	.98	.75	.68	.62	.72
06/14/79	.02	.00	.50	.28	.08	.02	.02	.02
06/18/79	.02	.02	.42	.25	.10	.02	.02	.02
06/21/79	.02	.00	.52	.45	.20	.08	.02	.02
06/25/79	.02	.00	.58	.35	.28	.30	.25	.20
06/28/79	.00	.00	.58	.48	.38	.40	.38	.38
07/02/79	.02	.00	.65	.45	.15	.05	.05	.12
07/05/79	.05	.02	.90	.65	.40	.28	.18	.10
07/09/79	.00	.00	.78	.72	.25	.22	.20	.28
07/12/79	.02	.02	.82	.58	.18	.12	.10	.10
07/16/79	.00	.00	.78	.48	.05	.08	.08	.08
07/19/79	.02	.00	.62	.48	.02	.05	.08	.05
07/23/79	.02	.02	.65	.52	.05	.08	.10	.22
07/26/79	.02	.00	.72	.65	.20	.05	.12	.10
07/30/79	.02	.00	.52	.22	.08	.05	.02	.02

(CONTINUED)

TABLE B-3. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
08/02/79	.02	.02	1.00	.95	.22	.12	.10	.08
08/06/79	.02	.00	.70	.45	.08	.08	.12	.22
08/09/79	.02	.00	.80	.70	.28	.10	.08	.08
08/13/79	.00	.02	.65	.42	.10	.05	.08	.10
08/16/79	.00	.02	1.01	.95	.38	.20	.10	.10
08/20/79	.05	.05	.68	.45	.08	.08	.10	.15
08/23/79	.00	.05	1.18	1.18	.50	.32	.18	.10
08/27/79	.05	.02	.88	.75	.45	.32	.28	.30
08/30/79	.00	.00	1.18	1.18	.72	.32	.15	.12
09/06/79	.00	.00	.55	.42	.25	.28	.45	.55
09/10/79	.02	.05	1.00	.90	.48	.25	.15	.15
09/13/79	.02	.00	.50	.48	.48	.82	1.22	1.35
09/17/79	.05	.02	.75	.88	.75	.82	.88	.68
09/20/79	.05	.02	.65	.42	.20	.12	.28	.50

TABLE B-4. AMMONIA NITROGEN (MG/L) IN CHANNEL B AT 1500 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	.08	.00	1.05	.75	.32	.12	.05	.05
01/09/79	.02	.00	.68	.40	.15	.05	.02	.02
01/16/79	.00	.00	.70	.48	.21	.14	.12	.12
01/23/79	.02	.00	.54	.60	.55	.42	.30	.30
01/25/79	.00	.00	.47	.43	.34	.28	.21	.22
01/29/79	.00	.00	.55	.53	.50	.53	.39	.33
02/01/79	.00	.00	.60	.53	.42	.51	.35	.37
02/05/79	.02	.00	.58	.32	.02	.02	.02	.05
02/08/79	.02	.00	.52	.35	.08	.08	.05	.02
02/12/79	.00	.00	.60	.45	.18	.05	.02	.00
02/15/79	.02	.00	.60	.36	.14	.05	.05	.02
02/19/79	.00	.00	.30	.10	.02	.02	.02	.02
02/22/79	.02	.00	1.00	.90	.70	.55	.45	.30
02/26/79	.00	.00	.45	.20	.08	.02	.02	.02
03/01/79	.00	.00	.40	.38	.05	.05	.05	.00
03/08/79	.02	.00	.62	.25	.02	.02	.05	.02
03/12/79	.02	.00	.42	.15	.02	.05	.10	.08
03/15/79	.02	.00	.70	.52	.05	.10	.12	.12
03/19/79	.02	.00	.52	.28	.02	.05	.12	.22
03/22/79	.02	.02	.55	.30	.02	.05	.08	.08
03/26/79	.02	.00	.58	.25	.02	.02	.05	.05
03/29/79	.02	.02	.92	.80	.30	.12	.10	.08
04/02/79	.02	.02	.50	.22	.05	.08	.08	.08
04/05/79	.02	.00	.68	.70	.10	.05	.05	.05
04/09/79	.02	.00	.42	.30	.05	.08	.10	.10
04/12/79	.02	.00	.35	.30	.05	.02	.02	.02
04/16/79	.05	.02	.38	.18	.05	.05	.05	.05
04/19/79	.05	.02	.50	.40	.05	.05	.05	.05
04/23/79	.05	.00	.45	.22	.05	.05	.05	.05
04/26/79	.02	.02	.88	.65	.15	.12	.10	.08
06/04/79	.02	.00	1.08	1.08	.48	.52	.50	.58
06/07/79	.05	.00	1.00	1.00	.65	.78	.70	.72
06/14/79	.02	.00	.65	.42	.15	.08	.05	.02
06/18/79	.02	.00	.65	.40	.10	.05	.05	.05
06/21/79	.02	.00	.80	.78	.58	.40	.10	.02
06/25/79	.08	.02	.62	.45	.48	.62	.68	.82
06/28/79	.00	.00	.48	.42	.58	.68	.68	.62
07/02/79	.02	.02	.60	.45	.30	.15	.10	.05
07/05/79	.02	.02	.98	.82	.50	.25	.08	.08
07/09/79	.02	.02	.60	.40	.05	.08	.28	.48
07/12/79	.02	.00	.72	.62	.25	.12	.10	.08
07/16/79	.00	.00	.70	.60	.20	.15	.12	.12
07/19/79	.02	.00	.62	.50	.05	.08	.08	.02
07/23/79	.00	.00	.68	.58	.10	.10	.12	.15
07/26/79	.02	.00	.68	.58	.25	.10	.12	.10
07/30/79	.05	.02	.62	.45	.05	.05	.08	.10

(CONTINUED)

TABLE B-4. (CONTINUED)

				CSTR				
DATE	B1	B2	B3	B4	B5	B6	B7	B8
08/02/79	.08	.02	.92	.80	.40	.40	.22	.12
08/06/79	.02	.00	.58	.38	.02	.10	.15	.18
08/09/79	.00	.00	.78	.70	.20	.20	.15	.08
08/13/79	.02	.02	.62	.42	.08	.10	.10	.12
08/16/79	.00	.02	.90	.85	.28	.30	.18	.10
08/20/79	.02	.00	.55	.38	.10	.10	.12	.12
08/23/79	.02	.00	1.05	1.05	.32	.25	.12	.08
08/27/79	.05	.02	.48	.22	.12	.18	.30	.52
08/30/79	.00	.00	.90	.80	.32	.30	.20	.12
09/06/79	.02	.02	.80	.60	.65	.92	1.25	1.70
09/10/79	.05	.02	1.18	1.25	1.25	1.30	1.35	1.25
09/13/79	.02	.00	.72	.50	.38	.40	.68	1.02
09/17/79	.08	.02	.65	.50	.38	.22	.15	.12
09/20/79	.02	.02	.72	.62	.42	.28	.28	.18

TABLE B-5. NITRATE NITROGEN (MG/L) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	.00	.00	1.18	1.20	1.15	.97	.64	.37
01/12/79	.00	.00	1.12	1.11	.99	.86	.73	.64
01/19/79	.00	.00	1.09	1.05	.98	.80	.68	.50
01/26/79	.00	.00	1.08	1.08	1.10	1.02	.98	.98
01/30/79	.00	.00	1.16	1.15	1.07	1.05	1.02	.99
02/02/79	.00	.00	1.07	1.06	.93	.96	.96	.95
02/06/79	.00	.00	1.03	1.08	.97	.93	.83	.74
02/09/79	.00	.00	1.06	1.05	.87	.80	.78	.71
02/13/79	.00	.00	.99	.96	.68	.71	.74	.69
02/16/79	.00	.00	1.10	1.09	.93	.88	.83	.75
02/20/79	.00	.00	1.03	.96	.84	.78	.69	.62
02/23/79	.00	.00	1.08	1.03	.85	.86	.85	.82
02/27/79	.00	.00	1.13	1.07	.86	.75	.73	.68
03/02/79	.00	.00	1.15	.92	.92	.79	.72	.68
03/05/79	.00	.00	1.17	1.16	.18	.10	.12	.23
03/09/79	.00	.00	1.09	1.10	.89	.82	.79	.74
03/13/79	.00	.00	1.11	1.10	.80	.81	.75	.70
03/16/79	.00	.00	1.10	1.10	.90	.84	.74	.64
03/20/79	.00	.00	1.11	1.12	.91	.75	.66	.61
03/23/79	.00	.00	.95	1.09	.80	.71	.60	.52
03/27/79	.00	.00	1.15	1.17	.95	.74	.64	.50
03/30/79	.00	.00	.99	1.01	.90	.77	.67	.56
04/03/79	.00	.00	1.05	1.11	.68	.76	.72	.67
04/06/79	.00	.00	1.05	1.03	.73	.73	.72	.61
04/10/79	.00	.00	1.05	1.08	.81	.86	.82	.72
04/13/79	.00	.00	1.08	1.16	.60	.72	.70	.64
04/17/79	.00	.00	1.19	1.34	1.03	.94	.88	.78
04/20/79	.00	.00	1.07	1.14	.86	.87	.77	.65
04/24/79	.00	.00	1.35	1.55	1.11	1.07	.99	.97
04/27/79	.00	.00	1.10	1.21	.92	.93	.78	.71
05/01/79	.00	.00	1.36	1.54	1.14	1.01	.88	.88
06/05/79	.00	.00	1.15	1.20	1.25	1.25	1.31	1.31
06/08/79	.00	.00	1.08	1.10	1.12	1.12	1.25	1.25
06/12/79	.02	.00	1.20	1.14	1.13	1.05	1.07	1.06
06/15/79	.00	.00	1.09	1.06	.94	.84	.73	.66
06/19/79	.02	.02	1.02	.91	.76	.62	.55	.49
06/22/79	.05	.02	1.02	.98	.76	.66	.52	.50
06/26/79	.02	.00	1.03	.99	.91	.90	.88	.82
06/29/79	.02	.00	1.06	1.00	.93	.90	.90	.90
07/03/79	.00	.00	1.01	1.01	.92	.85	.78	.78
07/06/79	.02	.02	1.05	1.00	.88	.83	.78	.72
07/10/79	.00	.00	.99	.97	.83	.84	.84	.84
07/13/79	.00	.00	1.04	1.02	.90	.86	.80	.72
07/17/79	.02	.00	1.14	1.08	.95	.81	.74	.68
07/20/79	.00	.00	1.15	1.10	.87	.71	.57	.47
07/24/79	.00	.00	1.14	1.11	.97	.85	.80	.73

(CONTINUED)

TABLE B-5. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/27/79	.02	.00	1.11	1.09	.97	.87	.78	.71
07/31/79	.00	.00	1.16	1.12	.96	.85	.80	.74
08/03/79	.00	.00	1.05	1.07	.97	.88	.80	.68
08/07/79	.00	.00	1.13	1.09	.95	.87	.82	.75
08/10/79	.00	.00	1.17	1.13	1.01	.96	.89	.76
08/14/79	.00	.00	1.15	1.09	1.00	.85	.82	.72
08/17/79	.00	.00	1.15	1.10	.98	.91	.83	.69
08/21/79	.00	.00	1.16	1.08	.95	.84	.84	.80
08/24/79	.00	.00	1.18	1.11	.96	.89	.84	.77
08/28/79	.00	.00	1.32	1.28	1.12	1.08	.99	.92
08/31/79	.00	.00	1.32	1.28	1.09	1.03	1.02	.98
09/04/79	.00	.00	1.14	1.12	.85	.85	.81	.78
09/07/79	.00	.00	1.27	1.18	1.05	.95	.91	.85
09/11/79	.00	.00	1.11	1.04	.84	.73	.67	.58
09/14/79	.00	.00	1.24	1.18	.94	.90	.79	.72
09/18/79	.00	.00	1.17	1.17	1.04	.94	.87	.84
09/21/79	.00	.00	1.17	1.17	1.09	1.01	.96	.93
09/24/79	.00	.00	1.11	1.04	.97	.89	.89	.89

TABLE B-6. NITRATE NITROGEN (MG/L) IN CHANNEL B AT 0800 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	.00	.00	1.18	1.18	1.11	1.09	.93	.76
01/12/79	.00	.00	1.22	1.15	1.07	.97	.82	.75
01/19/79	.00	.00	1.09	1.08	.98	.85	.75	.78
01/26/79	.00	.00	1.02	1.00	.93	.91	.91	.91
01/30/79	.00	.00	1.14	1.10	.92	.94	.93	.93
02/02/79	.00	.00	1.08	1.05	.89	.88	.88	.86
02/06/79	.00	.00	1.03	1.03	.81	.77	.72	.75
02/09/79	.00	.00	1.03	.98	.85	.82	.78	.73
02/13/79	.00	.00	.92	.86	.69	.66	.51	.44
02/16/79	.00	.00	1.01	.95	.69	.67	.56	.48
02/20/79	.00	.00	.90	.84	.53	.41	.29	.23
02/23/79	.00	.00	1.04	.96	.31	.41	.40	.39
02/27/79	.00	.00	1.01	.96	.54	.54	.45	.36
03/02/79	.00	.00	1.05	1.02	.69	.61	.57	.44
03/05/79	.00	.00	1.09	1.12	.17	.09	.13	.22
03/09/79	.00	.00	1.18	1.16	.81	.77	.72	.68
03/13/79	.00	.00	1.12	1.19	.82	.71	.63	.55
03/16/79	.00	.00	1.19	1.19	1.07	.94	.82	.68
03/20/79	.00	.00	1.25	1.34	1.16	1.09	1.03	.89
03/23/79	.00	.00	1.30	1.38	1.12	1.05	.96	.85
03/27/79	.00	.00	1.31	1.40	1.00	1.05	1.00	.87
03/30/79	.00	.00	1.13	1.16	.98	.99	.92	.73
04/03/79	.00	.00	1.36	1.42	1.22	1.21	1.18	1.07
04/06/79	.00	.00	1.18	1.17	.93	.96	.94	.78
04/10/79	.02	.00	1.34	1.38	1.08	1.10	1.08	1.01
04/13/79	.00	.00	1.42	1.34	1.17	1.07	1.00	.86
04/17/79	.00	.00	1.52	1.60	1.18	1.20	1.09	1.05
04/20/79	.00	.00	1.27	1.35	.99	.93	.85	.73
04/24/79	.00	.00	1.56	1.60	1.28	1.11	.99	.87
04/27/79	.00	.00	1.12	1.19	1.04	.94	.79	.59
05/01/79	.00	.00	1.09	1.06	.71	.83	.81	.77
06/05/79	.00	.00	1.18	1.35	1.25	1.25	1.26	1.23
06/08/79	.00	.00	1.10	1.15	1.10	1.12	1.25	1.25
06/12/79	.02	.00	1.12	1.14	1.08	1.07	1.06	1.00
06/15/79	.00	.00	1.13	1.05	.92	.81	.72	.62
06/19/79	.02	.02	1.08	.90	.72	.62	.53	.45
06/22/79	.00	.00	1.05	.94	.80	.64	.55	.46
06/26/79	.00	.00	1.03	1.01	.93	.92	.93	.91
06/29/79	.02	.00	1.04	.97	.86	.86	.90	.90
07/03/79	.00	.00	1.07	1.00	.95	.92	.89	.84
07/06/79	.00	.00	1.08	1.08	.98	.90	.80	.67
07/10/79	.00	.00	.89	.87	.82	.83	.84	.87
07/13/79	.00	.00	.97	.89	.85	.79	.72	.72
07/17/79	.00	.00	1.09	1.02	.86	.81	.77	.72
07/20/79	.00	.00	1.15	1.08	.87	.72	.63	.49
07/24/79	.00	.00	1.11	1.07	.89	.77	.71	.65

(CONTINUED)

TABLE B-6. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/27/79	.02	.00	1.14	1.09	.89	.76	.67	.57
07/31/79	.00	.00	1.11	1.07	.87	.62	.49	.39
08/03/79	.00	.00	1.07	.99	.85	.78	.76	.66
08/07/79	.00	.00	1.07	1.00	.85	.77	.73	.65
08/10/79	.00	.00	1.07	1.03	.84	.77	.74	.62
08/14/79	.00	.00	1.08	1.08	.88	.78	.68	.62
08/17/79	.00	.00	1.13	1.07	.90	.81	.77	.62
08/21/79	.00	.00	1.08	1.06	.85	.78	.68	.58
08/24/79	.00	.00	1.10	1.04	.91	.81	.72	.55
08/28/79	.00	.00	1.07	.89	.66	.62	.69	.69
08/31/79	.00	.00	1.16	1.11	.98	.90	.82	.69
09/04/79	.00	.00	1.10	1.12	.68	.74	.73	.69
09/07/79	.00	.00	1.27	1.27	.99	.93	.82	.70
09/11/79	.00	.00	1.05	.99	.77	.76	.68	.66
09/14/79	.00	.00	1.29	1.29	1.09	1.05	.92	.81
09/18/79	.00	.00	1.17	1.17	1.08	1.06	.99	.93
09/21/79	.00	.00	1.19	1.19	1.07	1.06	.99	.97
09/24/79	.00	.00	1.14	1.11	1.07	1.07	1.06	1.01

TABLE B-7. NITRATE NITROGEN (MG/L) IN CHANNEL A AT 1500 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	.00	.00	1.15	1.20	1.01	.74	.49	.44
01/09/79	.00	.00	1.02	1.07	.96	.84	.69	.63
01/16/79	.00	.00	1.08	1.06	.84	.67	.57	.54
01/23/79	.00	.00	1.10	1.10	1.08	1.02	1.00	1.00
01/25/79	.00	.00	1.27	.80	.93	1.14	1.12	1.05
01/29/79	.00	.00	1.28	1.27	1.21	1.19	1.05	1.02
02/01/79	.00	.00	1.01	1.01	.91	.92	.90	.90
02/05/79	.00	.00	1.06	1.03	.92	.87	.80	.79
02/08/79	.00	.00	1.06	.99	.79	.75	.76	.72
02/12/79	.00	.00	.99	.96	.81	.71	.68	.65
02/15/79	.00	.00	1.05	1.03	.89	.80	.78	.74
02/19/79	.00	.00	1.06	1.05	.88	.76	.74	.72
02/22/79	.00	.00	1.05	1.01	.86	.81	.82	.79
02/26/79	.00	.00	1.10	1.02	.87	.71	.70	.67
03/01/79	.00	.00	1.11	1.06	.88	.79	.70	.68
03/08/79	.00	.00	1.07	1.11	.81	.76	.81	.70
03/12/79	.00	.00	1.10	.95	.76	.67	.70	.64
03/15/79	.00	.00	1.06	1.05	.85	.73	.67	.62
03/19/79	.00	.00	1.09	1.06	.84	.69	.65	.62
03/22/79	.00	.00	1.07	1.03	.78	.63	.54	.50
03/26/79	.00	.00	1.10	1.11	.82	.65	.52	.42
03/29/79	.00	.00	1.01	1.01	.74	.59	.60	.47
04/02/79	.00	.00	1.05	1.04	.66	.68	.72	.70
04/05/79	.00	.00	1.08	1.04	.81	.64	.63	.53
04/09/79	.00	.00	1.03	1.05	.88	.78	.76	.66
04/12/79	.00	.00	1.07	1.06	.66	.65	.72	.67
04/16/79	.00	.00	1.14	1.27	.77	.73	.76	.73
04/19/79	.00	.00	1.09	1.18	.88	.75	.68	.56
04/23/79	.00	.00	1.22	1.34	1.03	1.00	.95	.87
04/26/79	.00	.00	1.18	1.31	1.04	.89	.77	.64
06/04/79	.00	.00	1.20	1.25	1.22	1.25	1.29	1.34
06/07/79	.02	.02	1.12	1.18	1.18	1.15	1.26	1.22
06/11/79	.00	.00	1.12	1.15	1.14	1.14	1.16	1.17
06/14/79	.00	.00	.98	.96	.85	.78	.64	.64
06/18/79	.00	.00	.94	.87	.75	.65	.55	.54
06/21/79	.02	.02	1.00	.89	.77	.66	.60	.48
06/25/79	.02	.02	1.07	1.00	.99	.94	.89	.81
06/28/79	.00	.00	1.05	.97	.95	.93	.91	.88
07/02/79	.00	.00	1.06	1.03	.94	.84	.90	.94
07/05/79	.02	.02	1.07	.98	.90	.78	.72	.64
07/09/79	.00	.00	.98	1.02	.89	.88	.86	.86
07/12/79	.00	.00	1.08	1.04	.94	.84	.77	.72
07/16/79	.00	.00	1.18	1.05	.96	.87	.77	.75
07/19/79	.02	.00	1.10	1.04	.76	.58	.48	.36
07/23/79	.00	.00	1.08	1.04	.86	.78	.74	.67
07/26/79	.00	.00	1.11	1.05	.93	.83	.73	.68

(CONTINUED)

TABLE B-7. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/30/79	.00	.00	1.07	1.02	.82	.56	.51	.50
08/02/79	.00	.00	1.08	1.03	.93	.82	.69	.60
08/06/79	.00	.00	1.09	1.06	.87	.82	.78	.74
08/09/79	.00	.00	1.10	1.06	.96	.86	.74	.65
08/13/79	.00	.00	1.14	1.11	.96	.90	.81	.80
08/16/79	.00	.00	1.12	1.08	.96	.84	.72	.54
08/20/79	.00	.00	1.12	1.11	.90	.85	.84	.82
08/23/79	.00	.00	1.12	1.09	.93	.83	.76	.64
08/27/79	.00	.00	1.30	1.25	1.04	.93	.90	.81
08/30/79	.00	.00	1.29	1.25	1.11	1.01	1.00	.94
09/06/79	.02	.00	1.21	1.16	.97	.87	.83	.77
09/10/79	.00	.00	1.10	.97	.76	.61	.56	.57
09/13/79	.02	.02	1.16	1.13	.99	.87	.71	.68
09/17/79	.00	.00	1.17	1.07	.97	.89	.84	.82
09/20/79	.00	.00	1.21	1.18	1.09	1.03	.96	.90

TABLE B-8. NITRATE NITROGEN (MG/L) IN CHANNEL B AT 1500 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	.00	.00	1.15	1.18	.94	.91	.71	.64
01/09/79	.00	.00	1.14	1.17	1.00	.87	.75	.72
01/16/79	.00	.00	1.15	1.15	.98	.80	.78	.73
01/23/79	.00	.00	1.10	1.08	1.02	.95	.85	.82
01/25/79	.00	.00	1.24	1.19	1.15	1.13	1.10	1.06
01/29/79	.00	.00	1.32	1.23	1.20	1.16	1.15	1.13
02/01/79	.00	.00	1.06	1.03	.93	.90	.85	.87
02/05/79	.00	.00	1.04	.99	.87	.85	.77	.79
02/08/79	.00	.00	1.02	.96	.82	.80	.76	.67
02/12/79	.00	.00	.86	.78	.59	.49	.49	.43
02/15/79	.00	.00	.93	.89	.66	.49	.53	.50
02/19/79	.00	.00	1.05	.90	.53	.30	.34	.30
02/22/79	.00	.00	1.00	.96	.36	.31	.35	.37
02/26/79	.00	.00	1.13	.90	.54	.42	.38	.35
03/01/79	.00	.00	1.06	.97	.67	.54	.47	.37
03/08/79	.00	.00	1.08	1.02	.78	.72	.77	.67
03/12/79	.00	.00	1.11	1.07	.74	.60	.59	.52
03/15/79	.00	.00	1.13	1.14	.98	.79	.71	.59
03/19/79	.00	.00	1.21	1.26	1.14	.99	.99	.90
03/22/79	.00	.00	1.25	1.30	1.02	.89	.89	.81
03/26/79	.00	.00	1.36	1.32	1.09	.98	.90	.82
03/29/79	.00	.00	1.13	1.15	1.03	.92	.83	.69
04/02/79	.00	.00	1.18	1.21	1.12	1.10	1.07	.99
04/05/79	.00	.00	1.17	1.17	1.03	.92	.83	.68
04/09/79	.00	.00	1.34	1.30	1.10	1.02	1.04	.96
04/12/79	.00	.00	1.33	1.40	1.16	1.01	.88	.73
04/16/79	.00	.00	1.47	1.48	1.33	1.12	1.09	.97
04/19/79	.00	.00	1.22	1.31	.95	.78	.69	.59
04/23/79	.00	.00	1.43	1.46	1.20	.98	.90	.78
04/26/79	.00	.00	1.20	1.31	.94	.71	.55	.33
06/04/79	.00	.00	1.25	1.25	1.22	1.18	1.23	1.23
06/07/79	.00	.00	1.15	1.12	1.12	1.12	1.25	1.28
06/11/79	.02	.00	1.25	1.20	1.09	1.09	1.09	1.11
06/14/79	.00	.00	.96	.95	.84	.74	.65	.63
06/18/79	.00	.00	.94	.80	.77	.66	.55	.50
06/21/79	.00	.00	1.04	.84	.68	.59	.49	.40
06/25/79	.02	.02	1.05	.97	.94	.91	.91	.87
06/28/79	.02	.00	1.03	.95	.91	.85	.90	.90
07/02/79	.00	.00	1.03	1.07	1.02	1.01	.94	.91
07/05/79	.00	.02	1.05	.99	.89	.80	.76	.63
07/09/79	.00	.00	1,00	.95	.90	.94	.95	.95
07/12/79	.00	.00	.97	.92	.87	.79	.72	.65
07/16/79	.00	.00	1.11	.99	.85	.82	.69	
07/19/79	.00	.00	1.07	.98	.75	.62	.53	.40
07/23/79	.00	.00	1.09	1.03	.84	.74	.72	.68
07/26/79	.02	.00	1.14	1.05	.84	.66	.63	.58

(CONTINUED)

TABLE B-8. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/30/79	.00	.00	1.12	1.06	.90	.82	.75	.73
08/02/79	.00	.00	1.01	.93	.85	.76	.67	.53
08/06/79	.00	.00	1.03	.96	.80	.75	.71	.64
08/09/79	.00	.00	1.00	.93	.83	.75	.61	.47
08/13/79	.00	.00	1.12	1.05	.84	.81	.69	.62
08/16/79	.00	.00	1.08	1.00	.87	.80	.64	.48
08/20/79	.00	.00	1.07	1.04	.77	.76	.68	.63
08/23/79	.00	.00	1.08	1.00	.86	.71	.58	.44
08/27/79	.00	.00	.71	.60	.70	.76	.81	.70
08/30/79	.00	.00	1.10	1.11	.95	.83	.74	.59
09/06/79	.00	.00	1.24	1.20	.94	.81	.64	.51
09/10/79	.00	.00	1.04	.91	.79	.71	.69	.71
09/13/79	.00	.00	1.24	1.20	1.03	.94	.82	.71
09/17/79	.00	.00	1.17	1.17	1.05	1.02	.96	.93
09/20/79	.00	.00	1.17	1.19	1.10	1.02	.99	.95

TABLE B-9. NITRITE NITROGEN (MG/L) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	.00	.00	.00	.00	.00	.01	.01	.01
01/12/79	.00	.00	.00	.01	.01	.02	.02	.02
01/19/79	.00	.00	.01	.01	.02	.02	.02	.02
01/26/79	.00	.00	.01	.01	.02	.03	.04	.04
01/30/79	.00	.00	.01	.02	.07	.05	.05	.05
02/02/79	.00	.00	.01	.02	.11	.09	.08	.09
02/06/79	.00	.00	.02	.02	.05	.05	.05	.06
02/09/79	.00	.00	.02	.03	.11	.10	.10	.11
02/13/79	.00	.00	.03	.04	.20	.09	.06	.06
02/16/79	.00	.00	.05	.07	.09	.07	.06	.07
02/20/79	.00	.00	.11	.15	.15	.11	.08	.08
02/23/79	.00	.00	.17	.25	.25	.19	.15	.13
02/27/79	.00	.00	.22	.33	.26	.20	.15	.12
03/02/79	.00	.00	.25	.36	.28	.23	.16	.12
03/05/79	.00	.00	.53	.76	.74	.55	.50	.47
03/09/79	.00	.00	.01	.08	.16	.23	.29	.36
03/13/79	.00	.00	.11	.25	.28	.17	.13	.10
03/16/79	.00	.00	.15	.28	.25	.21	.16	.14
03/20/79	.00	.00	.17	.28	.19	.20	.16	.14
03/23/79	.00	.00	.15	.26	.22	.17	.12	.10
03/27/79	.00	.00	.15	.33	.17	.14	.11	.10
03/30/79	.00	.00	.06	.19	.12	.15	.15	.14
04/03/79	.00	.00	.10	.31	.42	.29	.20	.15
04/06/79	.00	.00	.03	.12	.07	.07	.06	.07
04/10/79	.00	.00	.05	.22	.11	.09	.06	.06
04/13/79	.00	.00	.04	.19	.32	.18	.10	.08
04/17/79	.00	.00	.13	.28	.15	.16	.12	.12
04/20/79	.00	.00	.01	.04	.04	.03	.03	.03
04/24/79	.00	.00	.13	.15	.04	.03	.03	.03
04/27/79	.00	.00	.00	.01	.03	.02	.02	.01
05/01/79	.00	.00	.04	.04	.01	.01	.02	.02
06/05/79	.00	.00	.00	.00	.00	.00	.01	.01
06/08/79	.00	.00	.00	.00	.00	.00	.03	.03
06/12/79	.00	.00	.00	.01	.02	.03	.03	.04
06/15/79	.00	.00	.03	.06	.08	.08	.07	.06
06/19/79	.00	.00	.03	.07	.09	.08	.07	.06
06/22/79	.00	.00	.03	.07	.12	.12	.10	.08
06/26/79	.00	.00	.02	.06	.09	.10	.10	.10
06/29/79	.00	.00	.02	.05	.07	.08	.08	.08
07/03/79	.00	.00	.01	.04	.06	.07	.07	.07
07/06/79	.00	.00	.00	.02	.07	.07	.07	.06
07/10/79	.00	.00	.01	.03	.07	.06	.06	.06
07/13/79	.00	.00	.01	.03	.05	.04	.02	.03
07/17/79	.00	.00	.01	.04	.03	.04	.04	.04
07/20/79	.00	.00	.00	.02	.01	.01	.01	.01
07/24/79	.00	.00	.01	.04	.03	.05	.05	.05

(CONTINUED)

TABLE B-9. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/27/79	.00	.00	.01	.03	.05	.05	.04	.04
07/31/79	.00	.00	.02	.06	.04	.05	.05	.06
08/03/79	.00	.00	.00	.01	.01	.02	.02	.02
08/07/79	.00	.00	.02	.06	.05	.05	.06	.07
08/10/79	.00	.00	.01	.05	.07	.06	.06	.06
08/14/79	.00	.00	.03	.09	.08	.07	.08	.10
08/17/79	.00	.00	.00	.02	.04	.04	.05	.06
08/21/79	.00	.00	.02	.10	.07	.08	.08	.10
08/24/79	.00	.00	.00	.01	.02	.03	.04	.05
08/28/79	.00	.00	.02	.06	.08	.10	.09	.10
08/31/79	.00	.00	.00	.02	.06	.09	.08	.10
09/04/79	.00	.00	.01	.01	.08	.05	.05	.06
09/07/79	.00	.00	.00	.02	.03	.05	.04	.05
09/11/79	.00	.00	.00	.00	.01	.02	.03	.04
09/14/79	.00	.00	.01	.02	.08	.05	.03	.03
09/18/79	.00	.00	.00	.00	.01	.01	.01	.01
09/21/79	.00	.00	.00	.01	.03	.04	.04	.05
09/24/79	.00	.00	.00	.00	.00	.00	.00	.01

TABLE B-10. NITRITE NITROGEN (MG/L) IN CHANNEL B AT 0800 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	.00	.00	.00	.00	.07	.03	.02	.02
01/12/79	.00	.00	.00	.01	.03	.03	.03	.02
01/19/79	.00	.00	.00	.01	.01	.02	.03	.02
01/26/79	.00	.00	.01	.01	.04	.04	.04	.04
01/30/79	.00	.00	.01	.02	.05	.04	.04	.04
02/02/79	.00	.00	.02	.03	.06	.05	.05	.06
02/06/79	.00	.00	.07	.07	.04	.03	.03	.05
02/09/79	.00	.00	.12	.14	.10	.08	.07	.07
02/13/79	.00	.00	.16	.24	.21	.14	.09	.08
02/16/79	.00	.00	.21	.35	.33	.21	.14	.11
02/20/79	.00	.00	.39	.52	.37	.28	.20	.17
02/23/79	.00	.00	.18	.32	.31	.21	.12	.11
02/27/79	.00	.00	.37	.56	.34	.24	.10	.06
03/02/79	.00	.00	.35	.53	.36	.27	.13	.08
03/05/79	.00	.00	.51	.88	.58	.39	.32	.28
03/09/79	.00	.00	.30	.49	.27	.21	.18	.20
03/13/79	.00	.00	.33	.46	.18	.14	.09	.10
03/16/79	.00	.00	.19	.31	.13	.11	.08	.07
03/20/79	.00	.00	.25	.36	.12	.11	.09	.11
03/23/79	.00	.00	.22	.32	.13	.10	.06	.07
03/27/79	.00	.00	.19	.32	.20	.10	.05	.05
03/30/79	.00	.00	.05	.12	.04	.03	.03	.05
04/03/79	.00	.00	.12	.20	.08	.07	.04	.05
04/06/79	.00	.00	.02	.08	.07	.02	.01	.02
04/10/79	.00	.00	.04	.14	.10	.05	.04	.04
04/13/79	.00	.00	.03	.11	.05	.03	.02	.02
04/17/79	.00	.00	.03	.10	.14	.05	.03	.03
04/20/79	.00	.00	.01	.05	.11	.07	.03	.02
04/24/79	.00	.00	.02	.05	.02	.01	.01	.01
04/27/79	.00	.00	.00	.01	.01	.01	.01	.01
05/01/79	.00	.00	.01	.02	.09	.02	.01	.01
06/05/79	.00	.00	.00	.00	.00	.00	.02	.02
06/08/79	.00	.00	.00	.00	.00	.00	.04	.04
06/12/79	.00	.00	.00	.01	.02	.03	.04	.05
06/15/79	.00	.00	.02	.05	.06	.07	.06	.06
06/19/79	.00	.00	.02	.05	.06	.06	.05	.05
06/22/79	.00	.00	.03	.06	.08	.08	.07	.06
06/26/79	.00	.00	.02	.04	.05	.06	.07	.07
06/29/79	.00	.00	.01	.03	.04	.04	.05	.05
07/03/79	.00	.00	.01	.02	.03	.03	.03	.04
07/06/79	.00	.00	.00	.00	.00	.00	.00	.01
07/10/79	.00	.00	.01	.03	.03	.02	.01	.01
07/13/79	.00	.00	.01	.03	.03	.03	.03	.03
07/17/79	.00	.00	.01	.03	.04	.04	.03	.03
07/20/79	.00	.00	.00	.02	.03	.03	.02	.01
07/24/79	.00	.00	.01	.03	.06	.05	.04	.03

(CONTINUED)

TABLE B-10. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/27/79	.00	.00	.01	.03	.06	.06	.05	.05
07/31/79	.00	.00	.01	.03	.03	.03	.03	.03
08/03/79	.00	.00	.00	.03	.05	.04	.02	.02
08/07/79	.00	.00	.01	.05	.05	.05	.05	.07
08/10/79	.00	.00	.01	.05	.06	.05	.04	.03
08/14/79	.00	.00	.02	.10	.07	.07	.07	.08
08/17/79	.00	.00	.02	.11	.10	.09	.08	.06
08/21/79	.00	.00	.04	.19	.10	.10	.10	.12
08/24/79	.00	.00	.00	.01	.01	.01	.03	.03
08/28/79	.00	.00	.01	.09	.06	.08	.09	.13
08/31/79	.00	.00	.02	.11	.10	.10	.10	.11
09/04/79	.00	.00	.09	.05	.26	.19	.13	.09
09/07/79	.00	.00	.01	.01	.06	.05	.06	.08
09/11/79	.00	.00	.03	.01	.05	.02	.02	.02
09/14/79	.00	.00	.01	.01	.06	.05	.06	.07
09/18/79	.00	.00	.00	.01	.02	.02	.03	.05
09/21/79	.00	.00	.00	.01	.03	.02	.03	.05
09/24/79	.00	.00	.00	.00	.01	.01	.02	.04

TABLE B-11. NITRITE NITROGEN (MG/L) IN CHANNEL A AT 1500 HOURS

				CSTR				
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	.00	.00	.00	.00	.01	.01	.01	.01
01/09/79	.00	.00	.00	.01	.04	.04	.03	.02
01/16/79	.00	.00	.01	.01	.01	.01	.01	.01
01/23/79	.00	.00	.01	.01	.02	.03	.04	.04
01/25/79	.00	.00	.01	.01	.01	.02	.02	.03
01/29/79	.00	.00	.01	.01	.03	.03	.03	.03
02/01/79	.00	.00	.01	.02	.09	.08	.08	.08
02/05/79	.00	.00	.02	.02	.06	.05	.05	.06
02/08/79	.00	.00	.02	.03	.16	.13	.12	.10
02/12/79	.00	.00	.03	.04	.07	.07	.07	.07
02/15/79	.00	.00	.04	.06	.07	.08	.08	.08
02/19/79	.00	.00	.09	.13	.12	.09	.08	.08
02/22/79	.00	.00	.15	.21	.19	.17	.13	.11
02/26/79	.00	.00	.18	.30	.23	.19	.15	.13
03/01/79	.00	.00	.19	.32	.24	.19	.15	.12
03/08/79	.00	.00	.05	.19	.37	.46	.49	.50
03/12/79	.00	.00	.10	.20	.16	.13	.10	.08
03/15/79	.00	.00	.12	.25	.23	.19	.15	.13
03/19/79	.00	.00	.13	.24	.18	.19	.15	.13
03/22/79	.00	.00	.11	.22	.17	.17	.11	.10
03/26/79	.00	.00	.15	.27	.16	.15	.13	.13
03/29/79	.00	.00	.04	.14	.24	.23	.15	.11
04/02/79	.00	.00	.10	.26	.36	.24	.13	.10
04/05/79	.00	.00	.02	.08	.07	.14	.12	.12
04/09/79	.00	.00	.05	.17	.10	.10	.06	.06
04/12/79	.00	.00	.03	.12	.26	.15	.06	.05
04/16/79	.00	.00	.11	.21	.35	.25	.14	.12
04/19/79	.00	.00	.01	.02	.07	.07	.04	.04
04/23/79	.00	.00	.10	.11	.07	.05	.03	.03
04/26/79	.00	.00	.00	.01	.01	.01	.01	.01
06/04/79	.00	.00	.00	.00	.00	.00	.01	.01
06/07/79	.00	.00	.00	.00	.00	.00	.02	.03
06/11/79	.00	.00	.00	.00	.01	.01	.02	.03
06/14/79	.00	.00	.04	.06	.07	.07	.06	.06
06/18/79	.00	.00	.04	.08	.07	.07	.07	.06
06/21/79	.00	.00	.05	.11	.11	.09	.08	.07
06/25/79	.00	.00	.03	.08	.09	.11	.11	.11
06/28/79	.00	.00	.03	.08	.07	.09	.09	.09
07/02/79	.00	.00	.02	.05	.06	.08	.08	.08
07/05/79	.00	.00	.01	.04	.05	.07	.06	.06
07/09/79	.00	.00	.02	.03	.06	.07	.06	.06
07/12/79	.00	.00	.02	.04	.04	.04	.03	.03
07/16/79	.00	.00	.02	.05	.04	.05	.05	.05
07/19/79	.00	.00	.00	.04	.02	.02	.02	.02
07/23/79	.00	.00	.02	.06	.04	.04	.04	.05
07/26/79	.00	.00	.01	.05	.05	.05	.05	.04

(CONTINUED)

TABLE B-11. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/30/79	.00	.00	.01	.03	.03	.04	.04	.05
08/02/79	.00	.00	.00	.02	.02	.03	.03	.02
08/06/79	.00	.00	.03	.06	.05	.06	.07	.08
08/09/79	.00	.00	.02	.06	.06	.06	.06	.05
08/13/79	.00	.00	.04	.09	.09	.10	.11	.12
08/16/79	.00	.00	.00	.02	.04	.06	.06	.06
08/20/79	.00	.00	.03	.09	.08	.10	.11	.13
08/23/79	.00	.00	.00	.01	.02	.05	.06	.06
08/27/79	.00	.00	.02	.05	.06	.09	.08	.09
08/30/79	.00	.00	.00	.03	.07	.11	.10	.11
09/06/79	.00	.00	.01	.02	.03	.05	.05	.05
09/10/79	.00	.00	.00	.00	.02	.04	.04	.05
09/13/79	.00	.00	.02	.02	.01	.01	.04	.02
09/17/79	.00	.00	.00	.00	.00	.00	.01	.03
09/20/79	.00	.00	.01	.02	.03	.05	.04	.05

TABLE B-12. NITRITE NITROGEN (MG/L) IN CHANNEL B AT 1500 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	.00	.00	.00	.00	.01	.01	.01	.01
01/09/79	.00	.00	.01	.01	.02	.03	.03	.02
01/16/79	.00	.00	.01	.01	.02	.02	.02	.02
01/23/79	.00	.00	.01	.01	.02	.02	.02	.02
01/25/79	.00	.00	.01	.01	.02	.02	.02	.02
01/29/79	.00	.00	.01	.01	.02	.02	.02	.02
02/01/79	.00	.00	.02	.03	.04	.05	.07	.06
02/05/79	.00	.00	.06	.06	.03	.03	.05	.06
02/08/79	.00	.00	.10	.12	.10	.08	.06	.05
02/12/79	.00	.00	.14	.20	.16	.11	.09	.07
02/15/79	.00	.00	.18	.27	.24	.20	.12	.10
02/19/79	.00	.00	.35	.46	.39	.26	.20	.16
02/22/79	.00	.00	.20	.32	.26	.27	.20	.15
02/26/79	.00	.00	.29	.45	.26	.18	.10	.05
03/01/79	.00	.00	.29	.45	.33	.24	.15	.08
03/08/79	.00	.00	.24	.43	.32	.30	.31	.31
03/12/79	.00	.00	.27	.38	.21	.15	.11	.10
03/15/79	.00	.00	.12	.28	.14	.11	.07	.06
03/19/79	.00	.00	.17	.29	.11	.11	.09	.10
03/22/79	.00	.00	.15	.25	.13	.11	.06	.07
03/26/79	.00	.00	.16	.23	.13	.10	.05	.06
03/29/79	.00	.00	.02	.07	.05	.06	.05	.06
04/02/79	.00	.00	.10	.17	.10	.08	.05	.06
04/05/79	.00	.00	.01	.05	.02	.03	.02	.02
04/09/79	.00	.00	.04	.12	.08	.08	.04	.04
04/12/79	.00	.00	.02	.08	.04	.04	.02	.02
04/16/79	.00	.00	.03	.07	.05	.06	.03	.03
04/19/79	.00	.00	.00	.04	.15	.14	.06	.03
04/23/79	.00	.00	.02	.04	.02	.02	.02	.02
04/26/79	.00	.00	.00	.01	.08	.07	.03	.02
06/04/79	.00	.00	.00	.00	.00	.00	.02	.02
06/07/79	.00	.00	.00	.00	.00	.00	.04	.03
06/11/79	.00	.00	.00	.00	.01	.01	.03	.04
06/14/79	.00	.00	.04	.05	.06	.06	.05	.05
06/18/79	.00	.00	.04	.05	.05	.06	.05	.05
06/21/79	.00	.00	.04	.08	.07	.06	.06	.05
06/25/79	.00	.00	.03	.05	.06	.07	.07	.08
06/28/79	.00	.00	.02	.03	.04	.05	.05	.05
07/02/79	.00	.00	.02	.03	.03	.04	.04	.04
07/05/79	.00	.00	.00	.01	.01	.02	.02	.02
07/09/79	.00	.00	.02	.03	.02	.01	.00	.00
07/12/79	.00	.00	.03	.03	.03	.03	.03	.03
07/16/79	.00	.00	.01	.03	.03	.03	.03	.03
07/19/79	.00	.00	.01	.04	.03	.03	.02	.02
07/23/79	.00	.00	.01	.05	.04	.04	.03	.02
07/26/79	.00	.00	.01	.05	.06	.06	.05	.04

(CONTINUED)

TABLE B-12. (CONTINUED)

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/30/79	.00	.00	.03	.06	.05	.06	.07	.07
08/02/79	.00	.00	.01	.05	.03	.04	.03	.02
08/06/79	.00	.00	.02	.06	.05	.07	.07	.08
08/09/79	.00	.00	.02	.07	.05	.05	.04	.03
08/13/79	.00	.00	.03	.10	.08	.09	.09	.10
08/16/79	.00	.00	.02	.10	.08	.08	.06	.04
08/20/79	.00	.00	.05	.16	.13	.12	.12	.15
08/23/79	.00	.00	.00	.02	.02	.04	.04	.04
08/27/79	.00	.00	.01	.06	.08	.10	.09	.12
08/30/79	.00	.00	.02	.07	.07	.09	.08	.09
09/06/79	.00	.00	.01	.02	.04	.07	.08	.11
09/10/79	.00	.00	.00	.00	.01	.01	.01	.01
09/13/79	.00	.00	.01	.02	.05	.06	.06	.07
09/17/79	.00	.00	.01	.01	.03	.03	.04	.05
09/20/79	.00	.00	.01	.01	.02	.03	.03	.05

TABLE B-13. ORTHO PHOSPHOROUS (MG/L) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	.000	.002	.085	.040	.003	.002	.002	.002
01/12/79	.000	.002	.041	.012	.002	.002	.000	.000
01/19/79	.000	.007	.037	.006	.002	.002	.002	.002
01/26/79	.000	.000	.048	.007	.002	.002	.002	.002
01/30/79	.000	.000	.063	.011	.002	.003	.003	.002
02/02/79	.000	.000	.070	.020	.000	.000	.000	.000
02/06/79	.000	.003	.073	.029	.002	.002	.005	.035
02/09/79	.006	.002	.083	.053	.002	.002	.002	.002
02/13/79	.000	.002	.088	.073	.005	.015	.003	.003
02/16/79	.002	.002	.102	.074	.012	.004	.003	.002
02/20/79	.000	.000	.120	.112	.011	.006	.003	.003
02/23/79	.000	.004	.165	.170	.064	.008	.003	.004
02/27/79	.000	.002	.123	.107	.047	.010	.006	.003
03/02/79	.002	.004	.112	.096	.024	.015	.007	.004
03/05/79	.005	.006	.170	.195	.165	.138	.087	.022
03/09/79	.002	.002	.125	.117	.048	.040	.026	.014
03/13/79	.002	.002	.111	.097	.045	.043	.027	.011
03/16/79	.000	.000	.116	.094	.038	.028	.015	.009
03/20/79	.000	.002	.107	.087	.044	.030	.022	.014
03/23/79	.002	.004	.115	.084	.013	.010	.010	.009
03/27/79	.002	.002	.115	.085	.023	.007	.005	.006
03/30/79	.000	.002	.123	.104	.044	.023	.009	.007
04/03/79	.000	.003	.116	.102	.045	.031	.024	.011
04/06/79	.002	.002	.117	.106	.012	.016	.017	.006
04/10/79	.002	.003	.115	.110	.072	.047	.045	.019
04/13/79	.002	.003	.125	.104	.053	.037	.037	.018
04/17/79	.002	.002	.113	.111	.117	.091	.097	.101
04/20/79	.002	.002	.158	.151	.082	.055	.050	.037
04/24/79	.002	.002	.114	.110	.039	.063	.090	.084
04/27/79	.001	.001	.144	.147	.023	.029	.045	.042
05/01/79	.002	.002	.112	.100	.015	.043	.070	.062
06/05/79	.005	.005	.102	.102	.002	.008	.012	.018
06/08/79	.005	.008	.112	.114	.080	.058	.052	.055
06/12/79	.000	.008	.047	.015	.002	.002	.002	.005
06/15/79	.000	.022	.034	.022	.017	.017	.017	.017
06/19/79	.000	.002	.015	.005	.007	.004	.004	.004
06/22/79	.000	.003	.015	.003	.003	.003	.004	.004
06/26/79	.000	.005	.062	.015	.005	.005	.005	.007
06/29/79	.002	.012	.099	.025	.010	.006	.005	.004
07/03/79	.000	.002	.080	.032	.007	.006	.007	.012
07/06/79	.000	.000	.087	.041	.005	.007	.005	.003
07/10/79	.002	.002	.088	.098	.016	.008	.008	.012
07/13/79	.003	.002	.113	.071	.005	.007	.007	.007
07/17/79	.004	.004	.095	.070	.007	.008	.012	.009
07/20/79	.002	.005	.080	.053	.005	.006	.007	.006
07/27/79	.000	.000	.069	.040				

(CONTINUED)

TABLE B-13. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/31/79	.000	.002	.071	.052				
08/03/79	.000	.010	.134	.100				
08/07/79	.002	.002	.064	.035				
08/10/79	.002	.002	.095	.075				
08/14/79	.000	.000	.087	.060	.002	.005	.009	.007
08/17/79	.005	.012	.122	.108	.002	.008	.010	.010
08/21/79	.000	.000	.070	.050	.003	.004	.005	.007
08/24/79	.000	.000	.121	.112	.002	.002	.013	.012
08/28/79	.004	.002	.057	.038	.005	.003	.005	.007
08/31/79	.003	.006	.067	.052	.007	.004	.006	.007
09/04/79	.007	.005	.098	.082	.003	.006	.007	.005
09/07/79	.000	.000	.027	.007	.007	.006	.010	.009
09/11/79	.000	.002	.018	.022	.005	.008	.008	.008
09/14/79	.000	.002	.050	.042	.015	.008	.008	.009
09/18/79	.000	.003	.025	.004	.003	.003	.003	.007
09/21/79	.000	.003	.040	.010	.010	.007	.007	.008
09/24/79	.000	.006	.055	.015	.003	.003	.003	.004

TABLE B-14. ORTHO PHOSPHOROUS (MG/L) IN CHANNEL B AT 0800 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	.000	.002	.079	.032	.002	.003	.002	.002
01/12/79	.000	.002	.045	.013	.000	.002	.002	.002
01/19/79	.005	.002	.046	.009	.010	.002	.002	.002
01/26/79	.000	.002	.037	.006	.002	.000	.000	.000
01/30/79	.002	.002	.056	.024	.002	.002	.000	.000
02/02/79	.000	.000	.053	.014	.002	.002	.002	.002
02/06/79	.000	.000	.100	.062	.003	.002	.003	.002
02/09/79	.000	.000	.109	.096	.011	.003	.003	.002
02/13/79	.000	.002	.093	.116	.037	.006	.010	.002
02/16/79	.002	.002	.119	.122	.027	.005	.002	.002
02/20/79	.000	.000	.107	.101	.027	.006	.005	.002
02/23/79	.000	.000	.122	.118	.042	.010	.003	.002
02/27/79	.002	.002	.095	.113	.029	.013	.007	.003
03/02/79	.002	.002	.080	.087	.029	.017	.006	.003
03/05/79	.004	.003	.167	.182	.137	.098	.035	.005
03/09/79	.002	.002	.114	.102	.040	.032	.019	.010
03/13/79	.002	.002	.122	.109	.061	.046	.030	.013
03/16/79	.000	.002	.135	.116	.062	.040	.023	.009
03/20/79	.002	.002	.130	.108	.028	.043	.044	.016
03/23/79	.002	.002	.131	.102	.028	.033	.032	.016
03/27/79	.002	.004	.127	.100	.027	.024	.029	.018
03/30/79	.000	.002	.128	.108	.054	.047	.036	.012
04/03/79	.000	.002	.105	.085	.056	.046	.054	.035
04/06/79	.002	.002	.109	.097	.067	.050	.046	.022
04/10/79	.002	.003	.111	.108	.092	.084	.075	.064
04/13/79	.002	.002	.117	.112	.089	.069	.068	.064
04/17/79	.001	.002	.117	.115	.075	.080	.095	.105
04/20/79	.002	.002	.115	.103	.067	.050	.050	.047
04/24/79	.002	.002	.128	.116	.072	.067	.056	.045
04/27/79	.002	.002	.145	.133	.079	.050	.037	.024
05/01/79	.002	.002	.107	.086	.048	.031	.033	.018
06/05/79	.002	.002	.100	.102	.002	.010	.010	.010
06/08/79	.005	.005	.110	.108	.050	.033	.028	.032
06/12/79	.000	.005	.037	.006	.002	.002	.002	.002
06/15/79	.000	.015	.038	.017	.015	.015	.015	.015
06/19/79	.000	.002	.016	.002	.002	.002	.002	.002
06/22/79	.000	.002	.022	.003	.003	.004	.005	.004
06/26/79	.000	.006	.037	.019	.005	.004	.005	.005
06/29/79	.000	.005	.045	.007	.006	.005	.005	.005
07/03/79	.000	.002	.070	.007	.005	.005	.007	.008
07/06/79	.000	.000	.076	.021	.003	.004	.004	.004
07/10/79	.000	.003	.057	.031	.011	.010	.020	.010
07/13/79	.002	.002	.105	.076	.006	.007	.007	.010
07/17/79	.002	.003	.055	.088	.008	.010	.010	.015
07/20/79	.002	.006	.060	.050	.005	.005	.004	.005
07/27/79	.000	.000	.032	.031				

(CONTINUED)

TABLE B-14. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/31/79	.002	.007	.088	.063				
08/03/79	.000	.000	.099	.082				
08/07/79	.002	.002	.087	.067				
08/10/79	.002	.002	.125	.095				
08/14/79	.000	.000	.132	.092	.017	.008	.010	.006
08/17/79	.008	.005	.140	.112	.004	.005	.010	.008
08/21/79	.000	.000	.107	.064	.007	.008	.012	.011
08/24/79	.000	.000	.129	.108	.002	.002	.005	.010
08/28/79	.002	.002	.099	.045	.007	.006	.012	.007
08/31/79	.005	.006	.110	.093	.005	.014	.021	.012
09/04/79	.004	.005	.142	.114	.093	.069	.074	.035
09/07/79	.000	.000	.065	.022	.008	.009	.007	.010
09/11/79	.000	.000	.062	.022	.003	.002	.008	.004
09/14/79	.000	.000	.035	.012	.005	.006	.007	.007
09/18/79	.000	.002	.062	.020	.004	.004	.004	.004
09/21/79	.000	.000	.050	.011	.003	.004	.003	.003
09/24/79	.000	.000	.114	.038	.003	.004	.004	.003

TABLE B-15. ORTHO PHOSPHOROUS (MG/L) IN CHANNEL A AT 1500 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	.002	.002	.098	.070	.022	.008	.007	.007
01/09/79	.000	.003	.058	.021	.002	.002	.002	.002
01/16/79	.000	.002	.045	.009	.000	.000	.000	.000
01/23/79	.000	.000	.045	.010	.002	.002	.002	.002
01/25/79	.000	.002	.053	.015	.003	.002	.002	.002
01/29/79	.000	.000	.067	.017	.002	.000	.000	.000
02/01/79	.000	.000	.076	.025	.004	.002	.002	.002
02/05/79	.009	.005	.072	.041	.002	.002	.002	.002
02/08/79	.000	.002	.082	.053	.003	.004	.008	.003
02/12/79	.002	.002	.087	.076	.010	.002	.002	.002
02/15/79	.002	.002	.085	.067	.010	.003	.002	.002
02/19/79	.000	.000	.104	.091	.017	.003	.003	.002
02/22/79	.000	.008	.141	.180	.075	.008	.002	.002
02/26/79	.002	.003	.104	.097	.048	.015	.005	.002
03/01/79	.003	.004	.095	.082	.027	.014	.005	.002
03/08/79	.003	.002	.117	.111	.037	.057	.058	.042
03/12/79	.002	.002	.096	.081	.047	.032	.022	.010
03/15/79	.002	.002	.092	.079	.032	.022	.015	.010
03/19/79	.002	.002	.086	.070	.051	.028	.022	.012
03/22/79	.003	.012	.075	.054	.020	.010	.010	.008
03/26/79	.002	.002	.091	.063	.029	.017	.012	.008
03/29/79	.000	.002	.093	.090	.030	.013	.007	.006
04/02/79	.002	.003	.110	.097	.030	.030	.026	.009
04/05/79	.002	.002	.087	.080	.030	.015	.015	.007
04/09/79	.004	.002	.092	.096	.057	.040	.048	.017
04/12/79	.002	.003	.078	.069	.030	.028	.035	.018
04/16/79	.002	.002	.105	.108	.081	.090	.105	.095
04/19/79	.002	.002	.126	.121	.059	.035	.046	.043
04/23/79	.002	.002	.104	.106	.046	.071	.080	.077
04/26/79	.003	.003	.129	.108	.008	.020	.047	.040
06/04/79	.002	.005	.112	.108	.002	.005	.010	.022
06/07/79	.003	.002	.108	.108	.068	.045	.045	.050
06/11/79	.000	.005	.067	.037	.003	.003	.004	.004
06/14/79	.000	.002	.040	.019	.017	.017	.017	.017
06/18/79	.000	.002	.017	.005	.003	.003	.003	.003
06/21/79	.000	.002	.015	.005	.005	.003	.003	.003
06/25/79	.000	.002	.080	.029	.005	.006	.007	.005
06/28/79	.000	.002	.045	.012	.005	.005	.005	.007
07/02/79	.000	.000	.095	.035	.012	.010	.008	.007
07/05/79	.000	.002	.082	.015	.005	.005	.012	.005
07/09/79	.002	.002	.096	.108	.013	.007	.009	.009
07/12/79	.002	.002	.087	.052	.010	.007	.008	.007
07/16/79	.000	.002	.112	.070	.007	.009	.012	.008
07/19/79	.002	.002	.062	.037	.005	.007	.010	.008
07/23/79	.002	.002	.055	.039	.010	.007	.009	.007
07/26/79	.002	.002	.045	.024				

(CONTINUED)

TABLE B-15. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/30/79	.000	.003	.077	.045				
08/02/79	.000	.000	.083	.072				
08/06/79	.004	.002	.060	.035				
08/09/79	.000	.003	.056	.037				
08/13/79	.000	.000	.063	.058	.007	.007	.010	.008
08/16/79	.002	.015	.085	.085	.005	.010	.010	.015
08/20/79	.000	.000	.064	.043	.007	.004	.005	.005
08/23/79	.000	.000	.097	.075	.002	.002	.007	.013
08/27/79	.002	.002	.056	.027	.003	.002	.007	.002
08/30/79	.007	.002	.048	.028	.004	.007	.008	.008
09/06/79	.000	.000	.026	.016	.016	.010	.007	.007
09/10/79	.000	.000	.053	.020	.006	.010	.007	.011
09/13/79	.000	.000	.113	.066	.010	.005	.007	.010
09/17/79	.000	.003	.008	.003	.003	.003	.004	.005
09/20/79	.000	.002	.022	.039	.051	.030	.011	.005

TABLE B-16. ORTHO PHOSPHOROUS (MG/L) IN CHANNEL B
AT 1500 HOURS

				CSTR				
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	.002	.002	.094	.063	.020	.007	.004	.003
01/09/79	.000	.002	.063	.025	.004	.003	.003	.002
01/16/79	.000	.002	.051	.012	.001	.001	.001	.002
01/23/79	.000	.000	.036	.007	.002	.002	.002	.002
01/25/79	.000	.003	.042					
01/29/79	.000	.000	.070	.022	.002	.002	.000	.000
02/01/79	.000	.000	.048	.017	.000	.000	.000	.000
02/05/79	.000	.002	.106	.062	.004	.002	.003	.002
02/08/79	.002	.002	.087	.072	.006	.003	.003	.002
02/12/79	.000	.002	.080	.102	.024	.004	.007	.003
02/15/79	.002	.002	.082	.083	.017	.011	.003	.002
02/19/79	.000	.000	.091	.081	.025	.011	.004	.002
02/22/79	.000	.000	.160	.173	.088	.020	.003	.000
02/26/79	.000	.002	.100	.098	.030	.009	.002	.000
03/01/79	.004	.002	.072	.062	.025	.015	.005	.002
03/08/79	.002	.002	.100	.093	.057	.045	.028	.014
03/12/79	.005	.002	.105	.088	.058	.047	.031	.011
03/15/79	.000	.000	.107	.092	.037	.029	.017	.009
03/19/79	.002	.002	.108	.090	.027	.035	.034	.016
03/22/79	.002	.004	.098	.075	.018	.022	.023	.017
03/26/79	.000	.002	.105	.085	.034	.027	.026	.016
03/29/79	.000	.004	.104	.087	.044	.034	.018	.008
04/02/79	.002	.002	.094	.084	.060	.052	.049	.024
04/05/79	.002	.001	.064	.067	.025	.028	.025	.015
04/09/79	.002	.001	.095	.104	.080	.087	.076	.056
04/12/79	.002	.002	.073	.092	.065	.054	.056	.048
04/16/79	.003	.003	.112	.122	.096	.090	.098	.093
04/19/79	.001	.002	.061	.090	.045	.050	.052	.047
04/23/79	.003	.002	.110	.115	.070	.058	.043	.022
04/26/79	.002	.001	.110	.105	.047	.030	.025	.015
06/04/79	.002	.002	.110	.005	.005	.012	.030	.050
06/07/79	.002	.003	.100	.100	.007	.028	.032	.035
06/11/79	.000	.005	.042	.025	.002	.002	.002	.002
06/14/79	.000	.002	.035	.022	.017	.017	.017	.015
06/18/79	.000	.004	.017	.005	.003	.003	.003	.004
06/21/79	.000	.002	.012	.005	.003	.002	.002	.002
06/25/79	.000	.003	.075	.025	.003	.002	.003	.003
06/28/79	.000	.005	.042	.010	.006	.006	.005	.007
07/02/79	.000	.000	.080	.025	.007	.007	.010	.010
07/05/79	.000	.002	.082	.015	.005	.004	.004	.004
07/09/79	.002	.002	.078	.040	.009	.010	.007	.005
07/12/79	.002	.002	.090	.053	.008	.010	.010	.007
07/16/79	.002	.002	.092	.107	.009	.017	.017	.013
07/19/79	.002	.002	.038	.039	.005	.007	.006	.006
07/23/79	.000	.000	.064	.055				
07/26/79	.000	.000	.032	.025				

(CONTINUED)

TABLE B-16. (CONTINUED)

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/30/79	.000	.000	.070	.055				
08/02/79	.000	.000	.099	.092				
08/06/79	.002	.003	.092	.077				
08/09/79	.000	.002	.085	.062				
08/13/79	.000	.000	.107	.076	.009	.012	.012	.008
08/16/79	.005	.005	.118	.088	.005	.008	.012	.008
08/20/79	.000	.000	.082	.060	.007	.015	.018	.012
08/23/79	.000	.000	.107	.080	.005	.002	.005	.010
08/27/79	.002	.002	.055	.025	.006	.015	.015	.007
08/30/79	.005	.002	.087	.066	.005	.005	.009	.010
09/06/79	.000	.000	.068	.033	.005	.008	.015	.012
09/10/79	.000	.000	.057	.025	.007	.005	.006	.005
09/13/79	.000	.000	.027	.008	.008	.006	.006	.009
09/17/79	.000	.002	.045	.013	.009	.007	.007	.008
09/20/79	.000	.002	.025	.003	.002	.002	.003	.002

TABLE B-17. TOTAL PHOSPHOROUS (MG/L) IN CHANNEL A
AT 0800 HOURS

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79			.075	.037	.012	.011	.013	.040
02/09/79			.092	.064	.011	.012	.008	.007
02/13/79			.098	.081	.015	.020	.010	.010
02/16/79			.109	.082	.019	.018	.009	.010
02/20/79			.126	.121	.022	.014	.008	.008
02/23/79			.167	.194	.117	.036	.015	.010
02/27/79			.129	.122	.062	.021	.012	.007
03/02/79			.129	.115	.054	.032	.020	.015
03/05/79			.175	.205	.198	.152	.102	.037
03/09/79			.132	.129	.067	.055	.040	.031
03/13/79			.112	.097	.058	.057	.042	.026
03/16/79			.118	.098	.050	.046	.032	.029
03/20/79			.113	.092	.057	.046	.037	.032
03/23/79			.115	.087	.030	.028	.026	.028
03/27/79			.130	.100	.044	.025	.022	.023
03/30/79			.137	.116	.063	.056	.025	.019
04/03/79			.125	.119	.075	.055	.040	.027
04/06/79			.132	.127	.037	.040	.037	.032
04/10/79			.119	.123	.097	.071	.066	.038
04/13/79			.135	.119	.080	.064	.058	.038
04/17/79			.127	.127	.148	.123	.124	.126
04/20/79			.167	.166	.105	.075	.069	.057
04/24/79			.123	.117	.062	.092	.115	.117
04/27/79			.149	.153	.077	.048	.067	.060
05/01/79			.117	.108	.030	.062	.093	.082
06/22/79			.025	.013	.008	.012	.010	.010
06/26/79			.070	.025	.015	.015	.016	.020
06/29/79			.104	.037	.017	.018	.016	.015
07/03/79			.087	.037	.021	.020	.023	.027
07/06/79			.096	.052	.020	.034	.023	.014
07/10/79			.093	.105	.037	.022	.024	.026
07/13/79			.118	.079	.023	.025	.035	.025
07/17/79			.108	.083	.022	.025	.033	.028
07/20/79			.100	.072	.020	.025	.027	.040
07/24/79			.071	.058	.020	.022	.026	.035
07/27/79			.082	.062	.022	.023	.025	.027
07/31/79			.087	.078	.025	.026	.032	.027
08/03/79			.143	.127	.018	.015	.020	.022
08/07/79			.078	.065	.020	.020	.023	.027
08/10/79			.102	.095	.015	.017	.018	.020
08/14/79			.095	.076	.020	.020	.022	.022
08/17/79			.138	.121	.010	.008	.015	.018
08/21/79			.075	.061	.013	.017	.023	.025
08/24/79			.128	.137	.016	.015	.030	.027
08/28/79			.068	.052	.018	.018	.022	.025
08/31/79			.072	.064	.016	.013	.016	.019

(CONTINUED)

TABLE B-17. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
09/04/79			.120	.126	.031	.027	.025	.020
09/07/79			.042	.035	.031	.044	.057	.052
09/11/79			.030	.038	.020	.030	.032	.037
09/14/79			.072	.070	.035	.038	.036	.034
09/18/79			.033	.017	.012	.012	.014	.020
09/21/79			.047	.025	.025	.031	.035	.035
09/24/79			.065	.025	.010	.011	.017	.023

TABLE B-18. TOTAL PHOSPHOROUS (MG/L) IN CHANNEL B
AT 0800 HOURS

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79			.106	.068	.011	.007	.006	.005
02/09/79			.115	.105	.017	.010	.007	.006
02/13/79			.110	.137	.047	.018	.020	.010
02/16/79			.129	.134	.045	.017	.012	.010
02/20/79			.115	.112	.040	.016	.015	.010
02/23/79			.129	.137	.069	.027	.013	.010
02/27/79			.101	.121	.055	.028	.022	.012
03/02/79			.097	.109	.057	.035	.018	.013
03/05/79			.171	.187	.154	.110	.051	.018
03/09/79			.124	.112	.052	.045	.035	.022
03/13/79			.240	.116	.072	.061	.045	.028
03/16/79			.144	.128	.077	.059	.037	.025
03/20/79			.137	.121	.051	.066	.065	.037
03/23/79			.136	.117	.052	.055	.054	.037
03/27/79			.137	.115	.047	.045	.050	.043
03/30/79			.140	.126	.078	.067	.050	.025
04/03/79			.118	.107	.082	.071	.075	.055
04/06/79			.127	.115	.095	.073	.058	.034
04/10/79			.118	.116	.108	.100	.090	.079
04/13/79			.125	.125	.102	.088	.082	.077
04/17/79			.127	.131	.098	.100	.116	.123
04/20/79			.116	.112	.070	.063	.057	.051
04/24/79			.135	.122	.085	.082	.076	.057
04/27/79			.154	.142	.088	.065	.052	.037
05/01/79			.111	.097	.078	.059	.054	.028
06/22/79			.032	.010	.008	.007	.008	.007
06/26/79			.046	.025	.014	.014	.015	.014
06/29/79			.060	.017	.016	.015	.020	.015
07/03/79			.082	.023	.015	.015	.019	.021
07/06/79			.092	.042	.017	.015	.013	.013
07/10/79			.062	.042	.024	.023	.040	.020
07/13/79			.109	.084	.022	.022	.023	.028
07/17/79			.065	.102	.029	.030	.029	.027
07/20/79			.072	.063	.021	.024	.026	.025
07/24/79			.067	.085	.024	.028	.025	.024
07/27/79			.055	.060	.027	.026	.027	.027
07/31/79			.110	.094	.046	.035	.037	.038
08/03/79			.120	.115	.022	.029	.040	.031
08/07/79			.100	.095	.023	.035	.040	.036
08/10/79			.132	.114	.017	.027	.030	.025
08/14/79			.140	.114	.041	.033	.034	.031
08/17/79			.140	.125	.010	.015	.018	.015
08/21/79			.115	.090	.022	.035	.037	.033
08/24/79			.137	.133	.014	.016	.027	.030
08/28/79			.107	.067	.019	.017	.028	.023
08/31/79			.118	.110	.014	.032	.037	.025

(CONTINUED)

TABLE B-18. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
09/04/79			.157	.142	.137	.100	.103	.066
09/07/79			.071	.031	.031	.026	.030	.035
09/11/79			.070	.032	.013	.013	.019	.016
09/14/79			.043	.024	.017	.017	.018	.021
09/18/79			.075	.027	.019	.015	.016	.017
09/21/79			.057	.020	.012	.012	.012	.014
09/24/79			.117	.048	.011	.010	.012	.015

TABLE B-19. TOTAL PHOSPHOROUS (MG/L) IN CHANNEL A AT 1500 HOURS

			CSTR					
DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/05/79			.084	.056	.013	.011	.010	.009
02/08/79			.090	.066	.017	.012	.020	.007
02/12/79			.095	.082	.022	.013	.009	.010
02/15/79			.090	.070	.019	.012	.010	.010
02/19/79			.117	.108	.029	.023	.010	.007
02/22/79			.172	.198	.092	.030	.012	.009
02/26/79			.132	.117	.067	.026	.023	.007
03/01/79			.119	.107	.050	.033	.022	.014
03/08/79			.122	.118	.053	.071	.074	.060
03/12/79			.102	.090	.059	.050	.039	.027
03/15/79			.108	.085	.048	.039	.033	.029
03/19/79			.096	.078	.060	.048	.043	.033
03/22/79			.084	.067	.038	.028	.025	.024
03/26/79			.107	.077	.046	.039	.035	.027
03/29/79			.100	.094	.050		.023	.019
04/02/79			.122	.115	.057	.058	.042	.025
04/05/79			.108	.101	.055	.048	.037	.023
04/09/79			.101	.112	.080	.064	.070	.031
04/12/79			.100	.093	.058	.057	.057	.037
04/16/79			.119	.131	.117	.120	.131	.118
04/19/79			.131	.129	.081	.062	.068	.062
04/23/79			.117	.121	.084	.100	.105	.100
04/26/79			.132	.115	.028	.043	.060	.066
06/21/79			.022	.012	.012	.010	.011	.010
06/25/79			.087	.032	.015	.014	.015	.017
06/28/79			.055	.030	.016	.017	.017	.022
07/02/79			.100	.047	.026	.022	.021	.020
07/05/79			.093	.038	.024	.021	.020	.019
07/09/79			.105	.120	.040	.034	.032	.025
07/12/79			.098	.063	.023	.027	.025	.027
07/16/79			.120	.086	.023	.029	.030	.030
07/19/79			.082	.062	.023	.025	.034	.028
07/23/79			.065	.055	.020	.019	.022	.018
07/26/79			.063	.048	.023	.024	.032	.027
07/30/79			.080	.075	.024	.025	.030	.025
08/02/79			.100	.097	.025	.022	.030	.026
08/06/79			.075	.060	.018	.020	.027	.031
08/09/79			.065	.063	.017	.017	.018	.021
08/13/79			.075	.072	.020	.021	.028	.024
08/16/79			.092	.092	.010	.012	.015	.020
08/20/79			.085	.060	.021	.018	.018	.021
08/23/79			.105	.097	.016	.017	.027	.030
08/27/79			.065	.046	.015	.016	.016	.016
08/30/79			.055	.040	.015	.020	.023	.024
09/06/79			.057	.064	.060	.054	.047	.042
09/10/79			.066	.044	.042	.044	.042	.050

(CONTINUED)

TABLE B-19. (CONTINUED)

			CSTR					
DATE	A1	A2	A3	A4	A5	A6	A7	A8
09/13/79			.135	.122	.024	.016	.016	.026
09/17/79			.017	.012	.011	.012	.018	.023
09/20/79			.035	.077	.096	.058	.051	.031

TABLE B-20. TOTAL PHOSPHOROUS (MG/L) IN CHANNEL B AT 1500 HOURS

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/05/79			.115	.068	.018	.007	.006	.005
02/08/79			.104	.087	.016	.008	.007	.006
02/12/79			.109	.127	.037	.015	.010	.008
02/15/79			.112	.107	.037	.020	.015	.012
02/19/79			.113	.099	.050	.025	.013	.011
02/22/79			.168	.181	.078	.024	.010	.015
02/26/79			.109	.113	.058	.030	.017	.012
03/01/79			.093	.083	.047	.036	.021	.016
03/08/79			.107	.101	.068	.057	.041	.022
03/12/79			.115	.101	.074	.065	.050	.029
03/15/79			.112	.102	.053	.046	.035	.024
03/19/79			.116	.105	.054	.067	.057	.037
03/22/79			.106	.094	.045	.054	.049	.039
03/26/79			.120	.107	.062	.056	.050	.037
03/29/79			.113	.104	.060	.052	.032	.021
04/02/79			.107	.103	.090	.076	.070	.042
04/05/79			.077	.090	.055	.052	.044	.032
04/09/79			.100	.119	.100	.108	.099	.073
04/12/79			.082	.104	.085	.072	.070	.064
04/16/79			.125	.136	.118	.113	.116	.110
04/19/79			.063	.095	.061	.066	.070	.062
04/23/79			.117	.126	.087	.072	.067	.037
04/26/79			.110	.108	.077	.048	.043	.032
06/21/79			.017	.011	.010	.010	.010	.014
06/25/79			.080	.028	.012	.011	.012	.012
06/28/79			.072	.025	.017	.021	.017	.022
07/02/79			.090	.036	.015	.016	.020	.020
07/05/79			.125	.035	.016	.015	.015	.017
07/09/79			.111	.056	.024	.028	.020	.015
07/12/79			.097	.066	.020	.025	.026	.020
07/16/79			.110	.130	.027	.037	.038	.030
07/19/79			.050	.054	.022	.032	.028	.028
07/23/79			.084	.090	.020	.020	.020	.018
07/26/79			.057	.050	.032	.026	.027	.027
07/30/79			.097	.076	.047	.037	.032	.037
08/02/79			.125	.122	.047	.045	.042	.037
08/06/79			.105	.087	.024	.037	.043	.035
08/09/79			.087	.076	.018	.026	.030	.027
08/13/79			.115	.100	.028	.037	.035	.030
08/16/79			.118	.100	.015	.020	.023	.012
08/20/79			.095	.085	.020	.037	.047	.037
08/23/79			.116	.101	.016	.017	.027	.026
08/27/79			.068	.050	.021	.030	.032	.022
08/30/79			.095	.085	.021	.020	.029	.025
09/06/79			.082	.052	.024	.032	.050	.045
09/10/79			.062	.031	.013	.011	.014	.014

(CONTINUED)

TABLE B-20. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
09/13/79			.044	.021	.020	.020	.020	.025
09/17/79			.054	.021	.011	.017	.016	.021
09/20/79			.037	.016	.013	.014	.016	.015

TABLE B-21. OXYGEN (MG/L) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	7.30	7.40	8.60	9.20	10.00	10.60	10.60	10.20
01/12/79	7.50	7.80	7.80	7.60	5.90	7.00	7.40	7.90
01/19/79	7.60	7.50	8.40	8.20	6.60	7.00	7.30	7.60
01/26/79	7.90	8.10	6.70	7.20	5.90	6.70	6.20	6.40
01/30/79	7.60	7.70	6.40	6.40	5.60	6.20	6.00	6.40
02/02/79	7.60	7.70	6.60	6.50	5.10	5.90	5.90	6.30
02/06/79	7.60	7.70	6.90	7.20	5.30	6.30	6.80	7.20
02/09/79	7.60	7.70	6.40	6.60	4.20	5.30	5.50	6.50
02/13/79	7.70	7.70	6.40	6.80	3.60	4.20	4.90	6.10
02/16/79	7.70	7.70	6.60	6.80	3.40	4.20	4.80	6.40
02/20/79	7.60	7.70	6.70	6.50	2.80	4.60	5.50	6.90
02/23/79	7.70	7.80	6.40	6.10	3.00	3.50	4.30	6.20
02/27/79	7.70	7.70	5.20	6.10	2.50	4.00	4.20	5.70
03/02/79	7.70	7.70	5.30	6.10	2.60	3.80	4.20	5.60
03/05/79	7.70	7.70	5.90	3.80	.80	1.00	1.10	1.20
03/07/79	7.70	7.60	6.00	6.10	3.50	3.90	4.10	4.40
03/09/79	7.60	7.70	6.70	6.40	2.20	3.30	4.30	5.20
03/13/79	7.60	7.70	5.90	6.10	2.30	3.10	4.40	4.90
03/16/79	7.60	7.70	6.20	6.60	3.10	4.20	5.40	5.90
03/20/79	7.70	7.80	7.10	7.60	6.10	6.30	7.00	7.40
03/23/79	7.60	7.70	6.80	7.10	5.40	5.50	6.40	6.90
03/27/79	7.60	7.70	6.30	6.60	4.60	5.10	6.30	6.90
03/30/79	8.00	8.00	5.80	5.90	2.40	3.30	4.90	5.80
04/03/79	8.00	8.00	4.40	5.20	2.30	3.80	5.40	7.10
04/06/79	8.00	7.90	5.10	5.30	1.60	2.70	3.40	5.50
04/10/79	8.10	8.00	5.00	4.90	1.80	2.90	3.60	5.30
04/13/79	8.10	8.30	5.80	5.00	1.60	3.40	4.00	5.50
04/17/79	8.00	7.90	5.60	4.60	2.30	3.10	4.00	5.60
04/20/79	8.00	7.90	5.80	5.00	1.80	2.60	3.30	4.90
04/24/79	7.90	7.90	5.60	5.10	1.60	3.10	3.80	5.40
04/27/79	7.90	7.90	6.10	5.50	1.60	2.00	2.60	3.90
05/01/79	7.90	7.90	5.80	5.70	2.30	3.10	3.80	4.60
06/05/79	7.90	8.20	7.50	8.00	6.50	7.40	7.60	7.50
06/08/79	7.80	8.30	7.80	8.10	7.10	7.30	7.50	7.50
06/12/79	7.80	8.00	7.50	7.90	6.90	7.10	7.50	8.20
06/15/79	7.80	7.90	7.20	7.80	7.10	7.40	7.30	7.90
06/19/79	7.50	7.60	8.10	9.90	9.40	9.90	9.90	10.30
06/22/79	7.80	7.60	7.60	9.50	9.20	9.50	9.60	9.80
06/26/79	7.80	7.80	6.50	8.80	6.90	7.70	8.10	8.60
06/29/79	7.40	7.40	6.20	8.20	5.40	6.60	7.60	8.20
07/03/79	7.80	7.80	6.80	8.90	6.90	7.90	9.20	9.90
07/06/79	7.90	7.80	5.90	7.20	4.50	5.30	6.20	7.60
07/10/79	8.00	8.20	6.70	7.60	3.20	4.20	5.80	7.20
07/13/79	7.90	8.00	6.70	8.40	4.70	5.70	6.30	7.30
07/17/79	7.80	7.80	5.90	7.50	5.20	6.00	6.20	7.30
07/20/79	7.70	7.70	5.90	7.20	5.50	6.20	6.10	7.10

(CONTINUED)

TABLE B-21. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/24/79	7.80	8.00	6.10	6.60	5.40	5.90	5.30	6.20
07/27/79	7.70	7.80	6.30	7.10	6.00	5.90	5.40	6.30
07/31/79	7.80	7.80	6.20	6.90	5.30	6.10	5.90	6.80
08/03/79	7.90	8.10	6.90	7.40	5.40	5.80	5.90	6.80
08/07/79	7.70	7.90	6.80	7.60	5.60	5.90	6.40	7.10
08/10/79	7.90	7.80	6.80	6.90	4.30	4.40	5.30	6.40
08/14/79	7.70	7.80	7.20	7.40	5.60	5.90	6.90	7.90
08/17/79	7.50	7.60	7.40	7.30	4.40	4.70	5.70	6.90
08/21/79	7.70	7.70	7.40	7.30	4.90	5.80	6.60	7.60
08/24/79	7.90	7.90	7.40	7.40	4.70	5.20	5.60	6.60
08/28/79	7.90	8.10	7.60	8.00	5.60	5.50	5.60	6.20
08/31/79	7.70	7.80	7.70	7.60	4.90	4.60	5.20	6.10
09/04/79	7.70	8.10	4.40	5.50	2.70	3.90	4.70	5.40
09/07/79	7.90	7.90	6.60	7.40	4.60	4.60	4.60	4.50
09/11/79	7.60	7.80	7.10	8.70	4.80	4.40	4.60	5.20
09/14/79	7.40	7.70	5.60	6.90	2.80	3.10	3.50	3.90
09/18/79	6.70	6.70	6.10	6.90	4.90	4.90	4.40	4.20
09/21/79	7.60	7.60	6.00	7.40	5.80	5.30	4.10	3.80
09/24/79	7.70	7.60	6.80	8.10	6.10	5.90	5.10	5.60

TABLE B-22. OXYGEN (MG/L) IN CHANNEL B AT 0800 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	7.30	7.40	8.90	9.80	9.90	10.20	9.90	9.70
01/12/79	7.60	7.70	7.50	7.40	5.90	6.90	7.20	7.50
01/19/79	7.50	7.60	8.40	7.90	6.50	7.00	6.50	7.10
01/26/79	7.80	7.90	6.40	7.00	5.50	5.90	5.90	6.50
01/30/79	7.60	7.60	6.10	6.40	3.60	4.70	5.80	6.40
02/02/79	7.50	7.60	6.00	6.60	3.70	4.90	5.50	6.40
02/06/79	7.60	7.70	6.20	6.70	4.00	5.50	6.30	7.40
02/09/79	7.50	7.50	5.20	5.20	2.50	4.40	5.30	6.40
02/13/79	7.60	7.70	4.50	4.10	1.50	5.10	6.20	6.90
02/16/79	7.70	7.60	4.10	4.50	1.20	4.10	5.50	6.40
02/20/79	7.70	7.80	4.80	5.10	1.70	4.40	6.10	6.90
02/23/79	7.70	7.80	4.80	4.60	1.20	2.00	4.40	6.30
02/27/79	7.70	7.80	5.20	5.60	1.00	2.80	4.60	6.30
03/02/79	7.70	7.80	5.00	5.60	1.50	2.70	4.50	6.20
03/05/79	7.80	7.70	5.60	3.40	.80	1.00	1.40	1.90
03/07/79	7.70	7.70	5.50	5.50	2.90	3.40	4.10	5.20
03/09/79	7.70	7.70	5.50	5.30	2.60	3.00	4.20	5.70
03/13/79	7.70	7.70	4.90	4.90	2.40	3.10	4.20	5.60
03/16/79	7.70	7.60	5.40	4.90	2.80	3.40	4.10	5.00
03/20/79	7.70	7.80	7.40	7.20	3.80	5.50	6.30	6.90
03/23/79	7.50	7.60	6.20	5.90	2.70	4.40	5.40	6.20
03/27/79	7.60	7.60	5.70	5.80	2.10	4.30	5.70	6.10
03/30/79	8.10	8.10	5.60	6.10	3.80	4.20	4.60	6.20
04/03/79	8.00	8.00	5.50	6.60	2.70	4.40	6.10	6.70
04/06/79	7.90	7.90	6.10	6.00	1.90	2.80	4.20	5.30
04/10/79	8.00	8.00	5.50	5.60	1.60	2.30	2.50	3.40
04/13/79	8.00	8.20	7.00	6.40	2.60	3.50	4.30	4.90
04/17/79	7.90	7.90	5.50	5.90	1.90	3.90	5.10	6.00
04/20/79	7.90	8.00	5.80	6.00	2.20	2.50	2.90	3.90
04/24/79	7.90	8.00	5.10	5.60	2.30	2.70	3.20	4.60
04/27/79	7.90	7.90	5.60	5.90	2.10	3.10	3.80	4.60
05/01/79	7.90	8.00	5.90	5.60	1.60	2.90	4.10	4.60
06/05/79	7.80	8.20	7.30	7.70	6.30	7.10	7.40	7.80
06/08/79	8.30	8.40	7.30	8.00	7.30	7.30	7.30	7.60
06/12/79	8.00	8.00	7.40	7.90	6.80	7.10	7.20	7.90
06/15/79	7.90	7.80	7.60	7.80	6.70	7.20	7.40	7.80
06/19/79	7.60	7.70	8.30	8.90	8.20	8.70	9.20	9.80
06/22/79	7.80	7.80	6.90	7.60	6.80	7.60	7.90	8.80
06/26/79	7.90	7.90	6.80	7.80	5.60	6.60	7.00	7.60
06/29/79	7.80	7.70	6.40	7.80	6.40	7.00	7.20	8.10
07/03/79	7.80	7.90	7.00	9.30	7.30	8.50	9.10	10.40
07/06/79	7.80	7.80	7.30	8.60	6.60	7.60	7.90	8.40
07/10/79	8.00	7.90	6.90	7.50	4.40	5.60	6.70	7.80
07/13/79	7.90	8.00	7.60	7.20	3.70	4.90	5.80	6.90
07/17/79	7.80	7.80	6.10	5.90	2.50	3.40	4.90	6.30
07/20/79	7.70	7.80	5.60	6.70	4.20	3.70	5.40	7.20

(CONTINUED)

TABLE B-22. (CONTINUED)

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/24/79	7.50	7.80	5.00	6.10	3.20	3.60	4.90	6.30
07/27/79	7.80	7.90	5.70	6.80	3.90	4.50	5.20	6.40
07/31/79	7.70	7.80	5.30	6.80	4.90	5.60	6.40	7.80
08/03/79	7.90	8.00	6.00	6.40	2.90	4.10	4.90	6.60
08/07/79	7.80	7.90	6.30	6.80	3.80	4.80	6.10	7.60
08/10/79	7.90	7.80	6.10	5.60	2.60	3.30	4.80	6.50
08/14/79	7.80	7.90	6.70	6.60	4.60	4.90	6.70	8.20
08/17/79	7.80	7.70	6.60	5.90	3.20	4.10	5.80	7.30
08/21/79	7.80	7.80	7.20	6.90	4.80	4.80	6.60	8.10
08/24/79	7.90	7.90	7.20	7.20	3.90	4.60	5.90	7.20
08/28/79	7.70	7.80	6.80	6.70	4.20	4.20	5.50	6.50
08/31/79	7.80	7.80	6.20	5.90	4.20	4.20	5.00	6.50
09/04/79	7.40	7.50	3.70	3.20	1.80	2.20	2.80	3.90
09/07/79	7.80	7.90	5.60	7.10	3.80	4.40	4.80	5.60
09/11/79	7.70	7.80	5.40	7.20	4.70	4.90	5.40	6.30
09/14/79	7.30	7.60	6.10	7.80	6.40	6.20	5.20	4.00
09/18/79	6.80	6.80	6.60	6.80	6.10	6.20	6.30	6.70
09/21/79	7.70	7.50	5.60	6.10	4.80	4.20	4.40	4.30
09/24/79	7.70	7.60	6.40	6.60	5.10	5.80	5.60	5.90

TABLE B-23. OXYGEN (MG/L) IN CHANNEL A AT 1500 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	7.30	7.40	8.60	9.10	10.10	10.60	10.40	10.00
01/09/79	7.60	7.70	9.90	9.70	7.60	8.40	9.10	9.00
01/16/79	7.60	7.80	10.20	9.80	7.80	8.80	9.00	8.90
01/23/79	7.50	7.50	9.80	9.60	8.40	7.80	7.50	7.30
01/29/79	7.50	7.60	12.80	11.90	9.70	9.00	9.10	8.80
02/01/79	7.70	7.70	12.80	12.20	10.10	9.60	10.10	9.80
02/05/79	7.60	7.70	12.60	12.80	9.80	10.00	11.40	10.80
02/08/79	7.60	7.70	12.80	12.60	10.80	11.60	11.60	11.20
02/12/79	7.60	7.70	11.80	10.90	8.60	9.80	10.80	10.80
02/15/79	7.60	7.70	11.40	11.40	9.00	10.90	11.00	10.90
02/19/79	7.60	7.70	10.00	10.00	9.80	10.20	10.20	9.90
02/22/79	7.80	7.90	8.00	8.00	6.90	7.20	8.30	8.30
02/26/79	7.60	7.60	11.20	11.50	9.30	9.00	8.80	9.00
03/01/79	7.70	7.80	12.50	12.40	11.30	10.60	10.50	10.80
03/05/79	7.60	7.60	3.70	2.80	.40	.70	1.00	1.30
03/06/79	7.70	7.70	5.30	3.90	1.20	1.30	1.20	1.50
03/07/79	7.70	7.70	10.00	10.70	10.00	9.60	9.50	9.80
03/08/79	7.70	7.70	10.20	10.30	9.90	9.60	10.00	10.90
03/12/79	7.70	7.60	11.20	11.50	9.20	9.60	9.50	9.20
03/15/79	7.60	7.60	10.20	9.60	9.00	8.80	8.90	8.80
03/19/79	7.60	7.70	9.20	8.90	8.80	8.60	8.70	8.80
03/22/79	7.70	7.80	9.40	9.00	8.70	8.70	8.80	8.60
03/26/79	7.70	7.80	9.60	9.00	8.70	8.90	9.00	8.80
03/29/79	8.00	8.00	16.40	13.80	10.70	11.40	12.30	12.60
04/02/79	8.00	8.00	11.80	14.40	11.90	12.80	14.50	14.00
04/05/79	7.90	8.00	10.50	10.60	8.40	10.30	12.60	13.40
04/09/79	8.00	8.10	11.30	12.80	9.30	11.60	12.60	12.40
04/12/79	7.90	8.00	12.90	13.60	10.60	12.90	14.10	14.40
04/16/79	8.00	8.00	12.10	13.80	10.60	12.60	13.30	14.20
04/19/79	8.00	8.00	12.10	12.80	11.80	12.20	12.60	14.40
04/23/79	7.90	7.90	11.80	13.80	10.00	11.40	11.10	12.40
04/26/79	7.90	7.90	11.40	11.10	8.60	10.00	9.90	13.10
06/04/79	7.50	7.90	7.20	7.50	6.40	7.30	7.50	7.30
06/07/79	7.80	8.00	7.30	7.80	6.80	7.10	7.40	7.20
06/11/79	7.40	7.70	9.50	10.30	9.60	10.10	10.40	10.00
06/14/79	8.20	8.30	12.80	12.90	12.00	12.20	11.80	12.60
06/18/79	7.90	7.80	15.80	16.60	14.30	13.10	12.90	12.80
06/21/79	7.80	7.90	14.80	15.80	13.90	12.70	12.10	11.50
06/25/79	7.70	7.90	13.60	14.80	11.20	9.90	9.70	9.70
07/02/79	7.80	7.70	13.60	16.10	14.30	14.80	12.70	11.10
07/05/79	7.80	7.80	12.60	14.60	12.80	13.40	13.20	12.20
07/09/79	7.90	8.00	13.70	13.80	9.60	10.00	11.00	10.80
07/12/79	8.00	8.00	13.80	14.60	10.60	11.20	11.80	12.10
07/16/79	7.70	7.80	12.30	14.20	11.40	12.10	12.40	12.60
07/19/79	7.60	7.50	12.60	12.80	10.90	11.40	11.80	12.10
07/23/79	7.70	7.90	13.90	14.30	10.70	10.60	10.60	10.40

(CONTINUED)

TABLE B-23. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/26/79	7.80	7.90	13.60	13.00	10.90	10.60	10.60	10.90
07/30/79	7.70	7.70	11.60	12.60	10.60	11.10	11.20	10.90
08/02/79	7.90	8.00	12.90	12.90	10.70	10.80	11.20	11.70
08/06/79	7.70	7.80	12.10	13.30	11.40	11.10	10.90	10.60
08/09/79	7.90	7.90	12.20	9.60	9.40	10.10	10.60	10.80
08/13/79	7.80	8.20	14.00	14.20	12.40	12.40	12.60	12.00
08/16/79	7.50	7.60	12.60	11.70	9.60	9.40	9.80	10.70
08/20/79	7.80	7.80	13.10	13.60	11.40	11.40	11.30	11.00
08/23/79	7.90	7.90	12.60	12.60	10.70	9.90	9.90	10.30
08/27/79	7.70	7.90	14.30	15.30	12.30	10.70	9.90	9.70
08/30/79	7.90	7.90	15.40	13.10	12.90	10.20	9.80	9.80
09/06/79	7.60	7.80	15.40	15.40	12.30	11.40	10.40	9.90
09/10/79	7.80	7.80	13.80	14.60	12.30	11.20	11.00	10.80
09/13/79	7.80	7.80	12.70	13.80	9.00	8.80	8.20	8.40
09/17/79	7.70	7.70	13.70	13.40	11.10	10.10	9.60	9.90
09/20/79	7.80	7.60	12.40	14.60	12.70	11.70	10.90	10.10

TABLE B-24. OXYGEN (MG/L) IN CHANNEL B AT 1500 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	7.20	7.30	8.80	9.70	9.70	10.00	9.80	9.40
01/09/79	7.50	7.60	9.80	9.50	7.80	8.20	9.00	8.70
01/16/79	7.50	7.70	10.10	9.70	7.70	8.40	8.30	8.40
01/23/79	7.40	7.50	10.40	9.30	7.80	7.30	6.80	6.90
01/29/79	7.50	7.60	14.50	12.00	9.80	9.20	9.40	9.00
02/01/79	7.60	7.70	14.10	12.60	9.70	8.90	10.10	9.70
02/05/79	7.60	7.80	12.90	13.20	10.40	10.00	11.60	10.50
02/08/79	7.70	7.80	12.60	12.80	10.40	10.40	10.80	10.40
02/12/79	7.60	7.70	12.60	11.90	10.30	11.10	10.60	9.80
02/15/79	7.70	7.70	12.30	11.40	7.60	12.20	10.40	10.00
02/19/79	7.70	7.80	10.80	10.60	9.80	10.20	9.90	9.90
02/22/79	7.90	8.00	7.80	7.30	2.30	4.70	7.00	8.00
02/26/79	7.60	7.70	11.40	11.00	7.80	8.90	9.30	9.50
03/01/79	7.70	7.70	13.80	12.30	7.90	9.00	9.60	10.90
03/05/79	7.50	7.60	3.70	2.50	.40	1.00	1.40	2.10
03/06/79	7.70	7.80	5.70	4.80	2.40	1.60	1.50	2.20
03/07/79	7.70	7.60	10.40	10.00	8.00	8.60	9.50	10.60
03/08/79	7.70	7.80	10.80	10.10	8.40	9.00	9.80	11.40
03/12/79	7.70	7.80	11.10	11.50	8.60	10.00	10.80	11.30
03/15/79	7.70	7.60	8.80	8.50	7.40	8.10	8.40	8.40
03/19/79	7.60	7.70	8.10	7.60	7.80	7.80	7.50	7.70
03/22/79	7.60	7.70	8.40	8.20	8.40	8.30	8.10	8.20
03/26/79	7.70	7.60	8.40	8.50	8.70	8.60	8.40	8.40
03/29/79	8.10	8.10	11.70	11.50	11.40	11.40	11.90	12.40
04/02/79	8.00	8.00	14.60	14.80	12.60	15.40	14.40	13.30
04/05/79	8.00	7.90	14.00	12.40	11.60	11.40	11.60	12.40
04/09/79	8.00	8.00	14.00	12.40	9.60	10.80	11.40	11.20
04/12/79	8.00	8.00	12.20	12.40	10.60	11.80	12.10	12.50
04/16/79	8.00	7.90	13.90	14.80	12.40	15.10	14.60	14.10
04/19/79	7.90	8.00	14.60	12.60	11.40	12.10	12.60	13.60
04/23/79	7.90	8.00	12.40	12.60	9.90	11.30	12.30	13.30
04/26/79	8.00	7.90	12.40	11.10	8.90	10.60	11.40	14.30
06/04/79	7.70	8.00	7.00	7.40	6.20	7.00	7.20	7.40
06/07/79	8.00	8.10	7.20	7.50	6.30	6.80	7.30	7.60
06/11/79	7.50	7.70	9.90	10.30	8.90	9.90	10.10	9.60
06/14/79	8.10	8.00	12.70	12.60	11.60	11.40	12.10	11.50
06/18/79	7.90	7.80	12.90	14.90	13.60	13.00	13.40	13.20
06/21/79	7.90	7.90	13.80	13.40	11.80	11.60	11.80	11.90
06/25/79	7.80	7.90	13.80	14.80	9.30	8.40	9.00	8.90
07/02/79	7.80	7.80	16.80	17.40	11.40	11.80	12.30	12.10
07/05/79	7.80	7.80	16.80	15.50	13.10	12.60	12.60	12.60
07/09/79	7.90	8.00	16.20	16.40	11.60	12.40	11.40	10.60
07/12/79	8.10	7.90	14.60	15.20	10.70	13.10	12.30	12.00
07/16/79	7.90	7.90	14.40	14.10	10.30	11.40	10.40	10.10
07/19/79	7.70	7.80	16.30	14.10	10.90	11.40	11.20	11.70
07/23/79	7.80	7.80	13.60	12.40	9.90	10.40	10.30	10.00

(CONTINUED)

TABLE B-24. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/26/79	7.90	7.90	13.80	12.40	10.00	10.20	10.40	10.00
07/30/79	7.80	7.80	12.80	13.40	11.40	12.10	13.10	12.10
08/02/79	7.80	7.90	12.10	11.80	9.80	10.10	11.20	12.00
08/06/79	7.80	7.90	12.40	13.00	10.60	10.90	11.30	11.10
08/09/79	7.80	7.90	11.50	11.10	8.90	9.40	10.40	11.30
08/13/79	7.90	8.20	12.50	14.00	11.50	12.00	12.50	12.50
08/16/79	7.60	7.70	11.60	10.80	9.30	9.80	10.60	11.40
08/20/79	7.90	7.80	14.40	13.90	12.10	11.70	12.20	12.20
08/23/79	7.80	7.90	13.60	13.20	10.10	10.50	10.90	11.60
08/27/79	7.70	7.90	11.60	13.00	11.80	11.40	10.70	10.10
08/30/79	7.90	7.80	12.90	12.60	9.80	10.00	10.10	10.40
09/06/79	7.70	7.80	12.00	13.40	9.00	10.30	10.40	10.30
09/10/79	7.80	7.80	12.40	12.70	9.20	9.40	9.30	10.20
09/13/79	7.70	7.80	12.50	14.60	12.40	11.80	11.40	9.80
09/17/79	7.70	7.80	14.20	15.10	11.80	12.00	12.20	11.80
09/20/79	7.60	7.70	12.20	11.20	9.60	9.60	9.80	9.60

TABLE B-25. PH IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	7.00	9.60	7.30	7.70	8.10	8.80	9.00	9.40
01/12/79	7.20	9.90	7.40	7.80	7.60	8.40	8.90	9.10
01/19/79	7.20	9.60	6.60	6.60	7.20	7.80	8.30	8.90
01/26/79	7.10	10.00	6.90	7.00	7.00	7.10	7.20	7.30
01/30/79	7.10	10.00	6.90	7.00	7.10	7.20	7.20	7.30
02/02/79	7.20	9.90	7.20	7.00	7.00	6.90	6.80	6.90
02/06/79	7.10	10.10	6.80	7.00	7.00	7.10	7.10	7.30
02/09/79	7.10	9.90	7.10	7.10	6.90	7.10	7.10	7.20
02/13/79	6.90	9.90	6.50	6.50	6.30	6.40	6.50	6.70
02/16/79	7.20	10.00	6.90	6.80	6.70	6.60	6.70	6.80
02/20/79	7.40	10.10	6.80	6.70	6.60	6.60	6.70	6.90
02/23/79	7.40	10.10	6.70	6.60	6.60	6.60	6.60	6.60
02/27/79	7.00	10.10	6.70	6.60	6.60	6.50	6.50	6.50
03/02/79	7.00	10.00	6.50	6.50	6.40	6.50	6.60	6.60
03/05/79	7.20	10.00	6.70	6.70	6.60	6.70	6.70	6.70
03/09/79	7.10	9.00	5.10	5.10	5.30	5.50	5.80	5.90
03/13/79	7.20	9.80	6.60	6.40	6.50	6.50	6.50	6.50
03/16/79	7.30	9.80	6.20	6.30	6.30	6.30	6.40	6.40
03/20/79	7.40	9.90	6.20	6.30	6.20	6.30	6.40	6.40
03/23/79	7.20	9.80	6.30	6.40	6.30	6.40	6.40	6.40
03/27/79	7.30	9.90	6.40	6.40	6.40	6.50	6.50	6.60
03/30/79	7.40	9.60	6.00	6.00	6.10	6.10	6.10	6.00
04/03/79	7.20	9.60	6.60	6.60	6.80	6.80	6.80	6.80
04/06/79	7.40	9.50	5.20	5.30	5.40	5.70	6.00	6.30
04/10/79	7.20	9.60	5.90	6.00	6.10	6.20	6.30	6.30
04/13/79	6.10	9.60	6.30	6.20	6.10	6.20	6.40	6.50
04/17/79	6.90	9.60	6.20	6.30	6.40	6.70	6.90	7.60
04/20/79	6.90	9.50	4.80	5.00	5.30	5.70	6.00	6.20
04/24/79	6.80	9.70	6.40	6.40	6.40	6.60	6.70	6.70
04/27/79	6.80	9.70	4.70	5.00	5.40	5.80	6.00	6.00
05/01/79	6.50	9.50	6.50	6.60	6.60	6.60	6.50	6.40
06/05/79	7.00	9.80	6.80	6.70	6.40	6.40	6.60	6.60
06/08/79	7.20	9.70	6.60	6.50	6.70	6.80	6.90	6.90
06/12/79	6.80	9.80	6.80	6.90	7.00	7.00	7.70	8.70
06/15/79	7.40	9.80	7.20	7.10	7.60	8.70	9.00	9.20
06/19/79	7.00	9.60	6.50	6.60	7.70	8.70	9.00	9.10
06/22/79	7.30	9.40	6.30	6.40	6.40	6.80	8.40	8.90
06/26/79	7.10	9.50	6.50	6.60	6.70	6.80	7.50	8.40
06/29/79	7.60	9.60	5.80	5.80	5.70	5.80	6.00	6.20
07/03/79	6.30	9.30	6.80	6.70	6.80	7.90	8.90	9.10
07/06/79	6.90	9.80	5.10	5.30	5.40	5.60	5.90	6.20
07/10/79	6.90	9.30	6.00	6.10	6.10	6.20	6.30	6.40
07/13/79	6.30	9.00	5.90	6.00	6.10	6.00	6.20	6.40
07/17/79	7.00	9.20	6.30	6.30	6.40	6.40	6.40	6.50
07/20/79	7.00	9.20	5.40	5.50	5.40	5.70	5.90	6.10
07/24/79	7.60	10.10	6.50	6.60	6.70	6.60	6.60	6.70

(CONTINUED)

TABLE B-25. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/27/79	7.10	9.50	5.50	5.60	5.50	5.70	5.90	6.10
07/31/79	7.30	9.60	6.60	6.50	6.40	6.40	6.80	7.40
08/03/79	7.20	9.50	4.40	4.70	4.90	5.40	5.90	6.30
08/07/79	7.10	9.80	6.40	6.40	6.40	6.50	6.60	6.70
08/10/79	7.00	10.10	5.90	6.10	5.90	6.00	6.20	6.30
08/14/79	7.00	9.90	6.50	6.60	6.60	6.60	6.70	7.60
08/17/79	6.80	9.60	4.60	4.80	4.80	5.30	5.60	5.80
08/21/79	6.80	9.90	6.40	6.40	6.50	6.60	6.60	6.90
08/24/79	6.90	9.60	6.90	4.30	4.40	4.90	5.70	6.10
08/28/79	6.70	9.40	6.10	6.30	6.30	6.40	6.30	6.20
08/31/79	6.80	9.40	4.70	4.80	4.90	5.10	5.30	5.60
09/04/79	7.00	9.90	5.70	5.40	4.70	4.50	4.50	4.60
09/07/79	6.70	9.50	6.00	6.00	6.00	6.00	6.10	6.00
09/11/79	6.70	9.70	3.10	3.40	3.90	4.90	5.50	5.80
09/14/79	7.00	9.40	6.40	6.40	5.90	5.50	5.20	5.20
09/18/79	6.70	9.60	5.90	5.60	4.50	4.20	4.50	4.90
09/21/79	6.60	9.70	6.30	6.30	6.40	6.30	6.20	6.10
09/24/79	6.60	9.70	5.40	4.10	3.90	4.00	4.60	5.20

TABLE B-26. PH IN CHANNEL B AT 0800 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	6.80	9.40	7.30	7.80	7.70	8.30	8.90	9.10
01/12/79	7.30	9.60	7.70	8.10	8.00	8.60	8.90	9.10
01/19/79	7.20	9.50	6.70	7.00	7.30	7.80	8.30	8.80
01/26/79	7.40	10.10	7.00	6.90	6.90	6.80	7.10	7.20
01/30/79	7.20	10.00	6.60	6.70	6.90	7.10	7.20	7.30
02/02/79	7.30	9.80	6.40	6.60	6.70	6.80	6.90	6.90
02/06/79	7.20	10.00	7.20	7.30	7.20	7.20	7.30	7.40
02/09/79	7.20	9.80	6.80	6.90	6.90	7.10	7.10	7.20
02/13/79	7.10	10.00	6.00	6.00	6.00	6.30	6.70	6.90
02/16/79	7.10	9.90	6.10	6.20	6.10	6.50	6.70	6.80
02/20/79	7.20	10.00	6.90	6.90	7.20	7.30	7.40	7.50
02/23/79	7.50	10.00	6.10	6.20	6.40	6.50	6.60	6.60
02/27/79	7.10	10.00	6.50	6.40	6.30	6.40	6.50	6.40
03/02/79	7.10	9.90	6.50	6.50	6.50	6.50	6.60	6.60
03/05/79	7.00	10.00	6.70	6.60	6.70	6.70	6.70	6.70
03/09/79	7.00	9.80	6.10	6.20	6.20	6.10	6.10	6.00
03/13/79	7.30	10.00	6.50	6.50	6.60	6.60	6.50	6.50
03/16/79	7.40	10.00	6.20	6.20	6.30	6.40	6.40	6.40
03/20/79	7.10	10.00	6.40	6.40	6.40	6.40	6.40	6.40
03/23/79	7.20	9.90	6.40	6.40	6.50	6.50	6.50	6.40
03/27/79	7.20	9.90	6.80	6.80	6.80	6.90	6.90	7.00
03/30/79	7.20	9.90	5.90	6.00	6.10	6.20	6.30	6.40
04/03/79	7.40	9.80	6.50	6.60	6.70	6.70	7.00	7.40
04/06/79	7.20	9.60	5.00	5.10	5.20	5.50	5.90	6.20
04/10/79	7.10	9.70	5.90	6.00	5.90	6.00	6.00	6.10
04/13/79	6.50	9.70	6.10	6.20	6.10	6.20	6.30	6.50
04/17/79	7.00	9.60	6.10	6.30	6.30	6.60	7.00	7.20
04/20/79	6.80	9.60	5.50	5.70	5.80	6.00	6.40	6.70
04/24/79	6.70	9.60	6.30	6.40	6.50	6.50	6.60	6.70
04/27/79	6.60	9.60	4.50	4.90	5.40	6.00	6.40	6.70
05/01/79	6.40	9.60	6.00	6.10	5.90	5.60	5.40	5.60
06/05/79	7.10	10.00	6.60	6.60	6.30	6.60	6.70	6.60
06/08/79	7.20	9.60	6.50	6.90	7.00	6.90	6.90	7.00
06/12/79	7.10	9.70	6.90	7.10	7.10	7.30	7.50	8.30
06/15/79	7.40	9.80	6.70	7.10	7.20	7.50	8.40	8.90
06/19/79	7.10	9.70	6.90	7.20	7.50	8.60	8.90	9.00
06/22/79	7.10	9.80	5.70	5.90	6.20	6.70	7.10	7.60
06/26/79	7.00	9.80	6.40	6.60	6.70	7.00	7.10	7.30
06/29/79	7.10	9.70	6.00	6.10	6.20	6.20	6.40	6.30
07/03/79	6.40	9.60	6.80	7.10	7.40	8.20	8.70	8.90
07/06/79	7.20	9.40	4.20	4.30	4.60	5.20	5.90	6.30
07/10/79	7.10	9.70	6.10	6.10	5.90	5.80	5.80	5.70
07/13/79	6.40	9.30	6.20	6.10	6.10	6.10	6.20	6.40
07/17/79	7.10	9.50	6.30	6.40	6.50	6.50	6.50	6.60
07/20/79	7.00	9.40	5.20	5.30	5.40	5.80	6.10	6.20
07/24/79	7.40	10.00	7.70	6.20	6.20	6.10	6.20	6.30

(CONTINUED)

TABLE B-26. (CONTINUED)

				CSTR				
DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/27/79	7.70	10.20	6.20	6.30	6.20	6.30	6.40	6.30
07/31/79	7.10	9.90	6.90	7.20	7.40	7.70	7.90	8.50
08/03/79	7.00	9.70	5.70	6.00	5.90	6.30	6.60	6.40
08/07/79	6.90	9.80	6.60	6.70	6.80	6.80	6.90	7.00
08/10/79	6.80	10.00	5.80	5.90	5.90	6.10	6.40	6.30
08/14/79	6.80	9.80	6.80	7.00	7.20	7.40	7.60	8.10
08/17/79	6.90	9.80	5.60	5.50	5.60	5.80	5.90	5.90
08/21/79	6.90	9.80	6.80	7.00	7.10	7.30	7.70	8.10
08/24/79	6.80	9.60	4.40	4.70	4.80	5.50	6.10	6.30
08/28/79	6.80	9.60	6.00	6.20	6.30	6.40	6.40	6.50
08/31/79	6.90	9.60	5.40	5.50	5.50	5.60	5.70	5.70
09/04/79	7.10	9.90	5.90	5.70	5.30	4.50	4.20	4.10
09/07/79	6.80	9.60	6.20	6.30	6.20	6.20	6.20	6.20
09/11/79	6.80	9.80	5.10	4.10	3.70	3.60	3.60	3.80
09/14/79	7.10	9.60	7.50	8.50	7.70	7.20	6.90	6.90
09/18/79	6.90	9.80	5.60	5.90	5.90	6.00	5.90	5.80
09/21/79	6.80	9.80	5.60	5.70	5.80	5.90	5.90	5.90
09/24/79	6.80	9.80	6.00	5.90	5.80	5.90	5.80	5.60

TABLE B-27. PH IN CHANNEL A AT 1500 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	6.90	9.80	7.20	7.30	7.40	8.90	9.30	9.60
01/09/79	7.50	9.60	8.40	8.80	8.20	8.60	8.90	9.00
01/16/79	7.30	9.90	7.80	8.90	8.70	9.30	9.60	9.70
01/23/79	7.10	9.90	7.40	7.70	7.80	7.80	7.80	8.10
01/29/79	7.10	10.10	9.20	9.70	9.30	9.10	9.30	9.20
02/01/79	7.30	9.80	8.70	9.30	9.10	8.80	9.30	9.20
02/05/79	7.20	10.00	8.40	9.40	9.00	9.20	9.70	9.80
02/08/79	7.30	9.90	8.40	9.30	8.90	9.10	9.70	9.70
02/12/79	7.00	10.00	7.40	8.80	7.40	9.10	9.40	9.50
02/15/79	7.10	10.00	7.80	8.80	8.30	8.90	9.30	9.40
02/19/79	7.60	10.10	8.60	9.00	9.00	9.60	9.70	9.60
02/22/79	7.20	10.00	7.10	6.90	6.90	6.90	6.90	7.10
02/26/79	6.90	10.00	8.20	8.40	8.50	8.70	8.70	8.60
03/01/79	7.20	10.00	7.60	7.80	7.60	7.70	7.90	9.40
03/08/79	7.20	9.20	6.90	6.40	6.20	6.80	7.20	8.30
03/12/79	7.10	9.90	6.80	6.90	6.70	6.70	6.80	6.80
03/15/79	7.30	10.00	6.80	6.50	6.60	6.70	7.10	7.30
03/19/79	7.30	9.70	6.40	6.40	6.70	7.00	7.80	8.50
03/22/79	7.40	9.80	8.10	8.00	8.20	8.90	8.60	8.90
03/26/79	7.10	9.60	8.80	9.20	9.20	9.60	9.50	9.30
03/29/79	7.20	9.60	8.20	8.40	8.60	9.10	9.20	9.20
04/02/79	7.40	9.60	8.90	9.10	9.10	9.30	9.40	9.20
04/05/79	7.10	9.60	5.40	5.70	6.50	7.40	8.90	9.10
04/09/79	7.10	9.50	6.60	7.10	7.00	8.50	8.80	8.90
04/12/79	7.00	9.50	6.70	7.10	7.10	9.00	9.00	9.30
04/16/79	7.00	9.60	7.50	9.00	8.20	9.30	9.30	9.60
04/19/79	6.70	9.50	5.00	5.50	6.50	8.60	9.00	9.50
04/23/79	6.90	9.60	8.00	9.20	7.80	9.20	8.90	9.40
04/26/79	6.50	9.60	5.00	5.80	6.50	8.10	8.40	9.50
06/04/79	7.20	9.70	6.10	6.50	6.50	6.80	7.00	7.10
06/07/79	6.80	9.70	7.20	7.10	7.00	7.00	7.00	7.00
06/11/79	6.50	9.80	7.20	8.80	8.90	9.10	9.20	9.10
06/14/79	7.50	9.80	8.60	9.30	9.50	9.60	9.80	9.80
06/18/79	7.50	9.80	9.20	9.60	9.50	9.50	9.70	9.60
06/21/79	7.00	9.50	8.10	9.10	9.20	9.30	9.40	9.50
06/25/79	7.20	9.60	8.70	9.40	9.00	9.00	9.00	9.00
06/28/79	7.60	9.10	6.80	8.60	7.50	7.30	7.40	8.10
07/02/79	7.40	9.50	8.10	9.20	9.30	9.50	9.30	9.10
07/05/79	7.20	9.60	5.50	6.00	6.30	8.90	9.20	9.30
07/09/79	7.10	9.60	6.80	7.80	6.90	6.90	7.90	7.80
07/12/79	6.90	9.20	5.80	6.10	6.20	6.40	7.80	8.50
07/16/79	6.90	9.40	6.80	8.40	8.10	8.50	8.70	8.60
07/19/79	7.00	9.20	5.80	6.00	6.10	6.40	8.40	8.90
07/26/79	7.50	9.60	6.00	6.20	6.20	6.40	7.50	8.70
07/30/79	7.50	9.90	7.30	8.80	8.60	9.00	9.00	8.90
08/02/79	7.20	9.40	4.30	5.10	5.20	5.80	7.00	8.50

(CONTINUED)

TABLE B-27. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
08/06/79	6.80	9.80	6.40	8.70	8.30	8.70	8.90	8.80
08/09/79	7.00	9.80	6.30	6.30	6.50	6.90	7.60	8.80
08/13/79	7.10	10.30	7.90	9.30	9.20	9.50	9.50	9.50
08/16/79	6.80	9.40	4.70	5.10	5.30	5.70	7.10	8.90
08/20/79	6.80	10.10	7.10	9.10	8.90	9.20	9.30	9.20
08/23/79	7.00	9.60	4.20	4.50	4.80	6.20	7.50	8.20
08/27/79	6.90	9.90	8.00	9.10	8.70	7.90	7.50	7.30
08/30/79	6.80	9.50	4.50	5.50	6.10	6.10	6.30	7.60
09/06/79	6.80	9.50	8.10	8.80	8.20	7.80	7.50	7.10
09/10/79	6.80	9.50	3.50	3.90	5.10	6.40	8.20	8.80
09/13/79	6.70	9.60	6.50	6.50	4.50	3.90	3.90	4.00
09/17/79	6.10	9.60	6.10	4.20	4.00	4.10	4.50	3.80
09/20/79	6.70	9.80	6.90	8.90	8.70	8.80	8.70	8.40

TABLE B-28. PH IN CHANNEL B AT 1500 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	7.20	9.90	7.70	8.00	8.20	8.90	9.30	9.50
01/09/79	6.00	9.00	8.20	8.70	8.50	8.50	8.80	8.80
01/16/79	7.20	10.00	8.30	9.00	8.80	9.30	9.40	9.50
01/23/79	7.20	9.90	7.40	7.40	7.60	7.70	7.80	8.10
01/29/79	7.30	10.10	9.40	9.50	9.20	9.20	9.40	9.30
02/01/79	7.20	10.00	9.20	9.30	8.80	8.70	9.30	9.30
02/05/79	7.30	10.00	9.10	9.60	9.00	9.20	9.80	9.70
02/08/79	7.20	10.00	8.80	9.30	8.90	9.10	9.40	9.50
02/12/79	7.10	10.00	6.80	7.20	7.60	9.10	9.20	9.30
02/15/79	7.20	9.90	7.20	7.60	7.90	8.60	9.00	9.20
02/19/79	7.30	10.00	8.90	9.40	8.90	9.60	9.60	9.80
02/22/79	7.20	10.00	6.90	6.80	6.90	7.00	7.00	7.10
02/26/79	6.80	10.10	7.20	7.20	6.90	6.90	7.00	7.20
03/01/79	7.10	10.00	7.70	7.80	7.80	7.90	8.20	8.60
03/08/79	7.10	10.00	7.90	8.00	8.10	8.20	8.30	8.40
03/12/79	7.10	10.00	8.20	8.40	8.30	8.40	8.20	8.20
03/15/79	7.40	10.00	7.50	7.60	7.70	7.80	7.90	8.00
03/19/79	7.40	10.00	8.00	8.10	8.20	8.30	8.20	8.40
03/22/79	7.30	10.00	8.50	8.70	9.00	9.10	8.90	9.00
03/26/79	7.30	9.90	8.70	9.10	9.50	9.60	9.50	9.40
03/29/79	7.10	9.90	7.70	8.00	8.30	8.50	8.70	8.90
04/02/79	7.20	9.90	8.80	9.20	9.40	9.60	9.40	9.10
04/05/79	7.20	9.70	5.40	6.20	7.00	8.50	8.90	9.10
04/09/79	7.00	9.60	7.90	8.20	7.10	8.30	8.40	8.20
04/12/79	7.10	9.50	7.70	8.10	7.60	8.80	8.80	8.90
04/16/79	6.90	9.70	8.50	9.00	8.90	9.40	9.40	9.30
04/19/79	6.90	9.60	6.90	7.70	7.80	8.90	9.10	9.40
04/23/79	6.80	9.60	7.90	9.00	8.30	8.90	9.10	9.30
04/26/79	6.40	9.60	5.50	6.40	7.20	8.10	8.80	9.50
06/04/79	7.20	9.60	5.80	6.40	6.50	6.90	7.00	7.10
06/07/79	7.10	9.80	6.80	7.00	6.90	7.00	7.00	7.00
06/11/79	7.00	9.90	7.20	8.80	8.60	9.00	9.20	9.00
06/14/79	7.60	9.90	8.20	9.20	9.20	9.40	9.50	9.60
06/18/79	7.40	9.80	8.90	9.20	9.60	9.60	9.70	9.70
06/21/79	7.40	9.60	6.90	8.80	8.90	9.20	9.40	9.50
06/25/79	7.10	9.80	8.40	9.40	7.60	7.60	8.00	8.20
06/28/79	7.30	9.60	8.70	9.30	8.20	7.70	8.10	8.30
07/02/79	7.20	9.90	9.00	9.50	9.00	9.10	9.20	9.20
07/05/79	7.40	9.20	4.30	5.10	7.00	8.10	8.90	9.20
07/09/79	7.00	9.80	7.60	8.40	6.10	5.70	5.10	4.60
07/12/79	7.00	9.60	7.40	8.40	7.70	8.60	8.60	8.70
07/16/79	7.00	9.70	8.40	8.90	8.10	8.60	8.30	8.40
07/19/79	7.10	9.50	6.30	7.00	7.20	7.40	7.80	8.60
07/26/79	7.30	10.10	7.10	7.40	7.40	7.70	8.00	8.50
07/30/79	7.20	10.20	8.80	9.50	9.40	9.50	9.40	9.30
08/02/79	7.00	9.50	6.50	7.10	7.30	7.70	8.40	8.90

(CONTINUED)

TABLE B-28. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
08/06/79	6.90	10.20	8.70	9.30	8.90	9.10	9.20	9.20
08/09/79	6.80	9.90	7.40	7.50	7.70	7.90	8.70	9.10
08/13/79	7.20	10.20	8.30	9.40	9.30	9.50	9.60	9.60
08/16/79	6.70	9.70	6.60	6.70	6.70	7.80	8.20	8.70
08/20/79	6.90	10.00	8.90	9.50	9.40	9.50	9.60	9.50
08/23/79	6.90	9.80	4.40	5.00	5.50	7.60	8.50	9.00
08/27/79	6.80	10.00	8.20	9.40	9.10	8.70	8.10	7.80
08/30/79	6.90	9.70	6.90	7.20	7.10	7.40	7.70	8.20
09/06/79	6.90	9.70	7.70	8.90	7.10	7.40	7.70	7.60
09/10/79	6.70	9.80	3.90	3.70	3.60	3.60	3.80	4.20
09/13/79	6.80	9.40	8.90	9.20	8.80	8.50	7.10	5.30
09/17/79	6.80	9.70	6.90	8.10	7.50	8.30	8.80	8.90
09/20/79	6.80	9.70	7.40	7.50	7.60	7.90	8.00	8.00

TABLE B-29. WATER TEMPERATURE (DEGREES C) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/05/79	19.60	19.80	19.90	20.00	20.10	20.20	20.40	20.60
01/12/79	19.60	19.80	20.00	20.20	20.20	20.50	20.60	21.90
01/19/79	19.60	19.70	19.70	20.00	20.10	20.10	21.20	20.60
01/26/79	19.40	19.60	19.70	19.90	20.00	20.10	20.30	20.70
01/30/79	19.60	19.80	19.90	20.00	20.20	20.20	20.40	20.80
02/02/79	19.50	19.70	19.80	20.00	20.10	20.20	20.30	20.70
02/06/79	19.10	19.10	19.20	19.20	19.40	19.40	19.50	19.80
02/09/79	19.00	19.00	18.90	19.10	19.20	19.30	19.50	20.00
02/13/79	19.60	19.50	19.40	19.50	19.40	19.50	19.40	19.80
02/16/79	19.70	19.60	19.50	19.50	19.50	19.40	19.50	19.60
02/20/79	19.70	19.60	19.60	19.70	19.70	19.80	19.90	20.40
02/23/79	19.80	19.70	19.60	19.50	19.40	19.40	19.60	19.80
02/27/79	20.00	19.90	19.80	19.80	19.90	19.90	20.00	20.20
03/02/79	19.80	19.70	19.60	19.70	19.80	19.90	20.00	20.40
03/05/79	20.00	19.90	19.80	19.60	19.40	19.40	19.30	19.50
03/09/79	20.00	19.90	20.00	20.00	20.10	20.10	20.20	20.30
03/13/79	20.00	19.90	19.80	19.90	20.00	19.90	20.00	20.10
03/16/79	20.00	19.90	19.80	19.80	19.80	19.90	19.90	20.00
03/20/79	20.20	20.30	20.40	20.50	20.60	20.60	20.60	20.50
03/23/79	19.50	19.50	19.60	19.60	19.50	19.50	19.40	19.60
03/27/79	19.20	19.10	19.10	19.20	19.30	19.20	19.20	19.40
03/30/79	19.40	19.40	19.40	19.30	19.30	19.30	19.40	19.60
04/03/79	19.30	19.20	19.00	19.00	18.90	18.80	18.70	18.80
04/06/79	19.40	19.40	19.30	19.30	19.30	19.30	19.40	19.50
04/10/79	19.40	19.40	19.40	19.50	19.60	19.50	19.40	19.60
04/13/79	19.90	19.80	19.60	19.50	19.50	19.50	19.60	19.70
04/17/79	19.70	19.60	19.50	19.50	19.60	19.60	19.70	19.90
04/20/79	19.60	19.50	19.40	19.40	19.50	19.50	19.60	19.80
04/24/79	19.30	19.10	19.00	19.00	19.10	19.10	19.20	19.50
04/27/79	19.60	19.50	19.40	19.50	19.40	19.40	19.50	19.70
05/01/79	19.30	19.10	19.00	19.10	19.20	19.30	19.40	19.70
06/05/79	19.60	19.40	19.30	19.30	19.20	19.20	19.30	19.70
06/08/79	20.00	19.70	19.40	19.30	19.20	19.30	19.20	19.60
06/12/79	19.60	19.40	19.20	19.20	19.30	19.40	19.30	19.60
06/15/79	19.60	19.30	19.10	19.00	19.00	19.10	19.20	19.50
06/19/79	19.90	19.70	19.50	19.60	19.70	19.60	19.70	19.90
06/22/79	19.90	19.80	19.60	19.70	19.80	19.80	19.70	20.00
06/26/79	19.40	19.20	19.00	19.00	19.10	19.20	19.30	19.80
06/29/79	19.40	19.10	18.90	19.00	19.10	19.20	19.30	19.70
07/03/79	19.50	19.40	19.20	19.30	19.40	19.50	19.60	19.70
07/06/79	19.40	19.40	19.50	19.40	19.30	19.50	19.70	19.80
07/10/79	19.70	19.50	19.20	19.30	19.40	19.50	19.60	19.90
07/13/79	20.40	20.20	20.00	19.90	20.00	20.00	20.10	20.40
07/17/79	20.30	20.40	20.20	20.00	19.90	20.00	20.00	20.00
07/20/79	20.30	20.30	20.40	20.40	20.10	19.90	19.80	19.90
07/24/79	20.20	20.20	20.30	20.30	20.40	20.20	20.10	20.00

(CONTINUED)

TABLE B-29. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
07/27/79	20.40	19.90	19.70	19.70	19.60	19.60	19.60	20.00
07/31/79	20.30	20.00	19.70	19.70	19.60	19.60	19.70	20.00
08/03/79	20.50	20.30	20.00	19.70	19.70	19.60	19.60	19.50
08/07/79	20.40	20.40	20.30	20.10	19.90	19.70	19.80	19.60
08/10/79	20.60	20.10	19.90	19.80	19.70	19.70	19.70	19.90
08/14/79	20.50	20.40	20.20	20.00	19.80	19.70	19.60	19.60
08/17/79	20.40	20.50	20.40	20.20	20.10	19.90	19.80	19.60
08/21/79	20.60	20.40	20.10	19.90	19.70	19.60	19.70	19.90
08/24/79	20.60	20.60	20.60	20.80	20.90	20.90	20.90	21.20
08/28/79	20.40	20.50	20.60	20.70	20.70	20.90	20.80	20.90
08/31/79	20.40	20.20	19.80	19.80	19.60	19.60	19.70	19.90
09/04/79	20.40	20.00	19.70	19.70	19.60	19.60	19.70	20.00
09/07/79	20.10	19.50	19.40	19.50	19.60	19.80	19.90	20.00
09/11/79	20.10	20.00	19.60	19.50	19.60	19.70	19.80	19.90
09/14/79	20.40	20.00	19.60	19.60	19.60	19.70	19.80	20.10
09/18/79	20.40	20.30	20.10	19.80	19.70	19.60	19.60	19.70
09/21/79	20.60	20.50	20.30	20.10	20.00	19.80	19.90	19.80

TABLE B-30. WATER TEMPERATURE (DEGREES C) IN CHANNEL B AT 0800 HOURS

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/05/79	21.60	21.90	21.90	21.80	21.50	21.30	21.00	20.60
01/12/79	20.50	21.10	21.40	21.80	21.90	22.00	22.10	21.90
01/19/79	20.40	20.60	20.90	21.20	21.60	21.70	21.80	21.20
01/26/79	20.40	20.80	21.20	21.60	22.00	22.00	22.10	22.10
01/30/79	20.20	20.60	21.00	21.40	21.80	21.90	22.00	22.10
02/02/79	20.20	20.80	21.20	21.70	21.90	21.90	22.00	22.10
02/06/79	19.80	20.00	20.40	20.80	21.00	21.20	21.30	21.20
02/09/79	19.90	20.20	20.60	20.90	21.30	21.40	21.60	21.50
02/13/79	20.20	20.40	20.50	20.70	21.00	21.10	21.00	20.90
02/16/79	20.20	20.30	20.30	20.40	20.60	20.60	20.60	20.50
02/20/79	20.60	20.80	20.90	21.10	21.50	21.60	21.80	21.70
02/23/79	20.10	20.30	20.40	20.80	21.10	21.20	21.20	21.10
02/27/79	20.30	20.40	20.60	20.90	21.20	21.30	21.40	21.30
03/02/79	20.30	20.40	20.60	20.90	21.20	21.60	21.80	21.80
03/05/79	19.80	19.80	19.80	19.90	19.90	20.10	20.30	20.20
03/09/79	20.10	20.20	20.30	20.60	20.80	21.00	21.20	21.10
03/13/79	20.20	20.30	20.40	20.80	21.00	21.10	21.10	21.20
03/16/79	20.20	20.30	20.50	20.90	21.00	21.10	21.20	21.10
03/20/79	19.30	19.30	19.40	19.60	19.70	19.90	20.60	20.50
03/23/79	19.90	19.90	20.00	20.10	20.20	20.50	20.90	20.80
03/27/79	19.70	19.70	19.80	19.80	19.90	20.30	20.80	20.70
03/30/79	20.00	20.10	20.20	20.20	20.30	20.60	21.00	20.90
04/03/79	19.60	19.50	19.40	19.40	19.50	19.60	19.80	19.80
04/06/79	19.80	19.80	19.90	20.00	20.10	20.60	20.90	20.80
04/10/79	19.80	19.80	19.90	20.10	20.20	20.40	20.70	20.60
04/13/79	19.80	19.80	20.00	20.20	20.40	20.50	20.70	20.80
04/17/79	19.80	19.90	20.00	20.20	20.50	20.70	21.00	21.10
04/20/79	19.70	19.80	19.80	20.00	20.20	20.60	20.80	20.80
04/24/79	19.50	19.50	19.50	19.70	19.90	20.20	20.60	20.60
04/27/79	19.80	19.80	19.90	20.00	20.20	20.60	20.80	20.80
05/01/79	19.70	19.80	19.80	19.90	20.00	20.30	20.60	20.50
06/05/79	20.10	20.10	20.20	20.30	20.40	20.60	20.80	20.80
06/08/79	20.00	20.00	20.10	20.10	20.10	20.30	20.60	20.50
06/12/79	20.00	20.00	20.10	20.10	20.10	20.40	20.50	20.60
06/15/79	19.80	19.80	19.80	20.00	20.10	20.40	20.60	20.60
06/19/79	20.00	19.90	19.90	20.10	20.20	20.40	20.70	20.70
06/22/79	20.20	20.10	20.10	20.30	20.40	20.60	20.90	20.80
06/26/79	19.80	19.70	19.70	19.90	20.00	20.30	20.70	20.60
06/29/79	19.90	19.80	19.80	20.00	20.10	20.40	20.80	20.70
07/03/79	19.80	19.80	19.80	20.00	20.20	20.50	20.80	20.70
07/06/79	19.80	19.80	20.00	20.10	20.20	20.40	20.70	20.80
07/10/79	19.90	19.90	19.90	20.00	20.10	20.30	20.70	20.60
07/13/79	20.50	20.40	20.50	20.60	20.80	21.00	21.20	21.10
07/17/79	20.30	20.40	20.50	20.50	20.70	20.80	21.10	21.00
07/20/79	20.40	20.50	20.40	20.60	20.80	21.00	21.10	21.10
07/24/79	20.40	20.50	20.60	20.60	20.70	20.90	21.00	21.00

(CONTINUED)

TABLE B-30. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
07/27/79	20.90	20.10	20.20	20.20	20.20	20.30	20.40	20.50
07/31/79	20.80	20.60	20.10	20.00	20.00	20.10	20.20	20.10
08/03/79	20.80	20.60	20.20	20.10	20.10	20.20	20.30	20.50
08/07/79	20.60	20.50	20.40	20.20	20.10	20.00	20.20	20.40
08/10/79	20.60	20.50	20.40	20.40	20.30	20.50	20.80	20.70
08/14/79	20.70	20.50	20.20	20.00	20.20	20.30	20.50	20.70
08/17/79	20.60	20.50	20.30	20.10	19.90	20.10	20.20	20.40
08/21/79	20.40	20.30	20.40	20.40	20.50	20.60	20.60	20.80
08/24/79	21.10	21.30	21.60	21.60	21.70	21.80	21.90	21.80
08/28/79	21.10	21.10	21.30	21.30	21.40	21.50	21.60	21.50
08/31/79	20.50	20.30	20.40	20.40	20.50	20.80	20.90	21.10
09/04/79	20.50	20.20	20.30	20.40	20.60	20.90	21.20	21.20
09/07/79	19.90	19.90	20.00	19.90	20.00	20.00	20.10	20.20
09/11/79	20.00	19.90	19.80	19.90	20.00	20.10	20.30	20.20
09/14/79	20.20	20.00	20.00	20.20	20.40	20.70	20.90	20.90
09/18/79	20.50	20.40	20.40	20.40	20.50	20.80	21.00	21.10
09/21/79	20.40	20.40	20.40	20.30	20.30	20.40	20.60	20.80

TABLE B-31. WATER TEMPERATURE (DEGREES C) IN CHANNEL A AT 1500 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
01/02/79	20.50	20.80	21.20	21.40	21.60	21.70	21.80	21.80
01/09/79	19.70	20.00	20.30	20.40	20.40	20.60	20.70	20.70
01/16/79	19.60	19.80	20.00	20.10	20.30	20.40	20.40	21.00
01/23/79	19.30	19.60	19.70	19.90	20.10	20.20	20.40	20.80
01/29/79	19.80	20.40	20.80	21.00	21.30	21.40	21.30	21.60
02/01/79	19.80	20.20	20.80	20.90	21.10	21.10	21.10	21.50
02/05/79	19.30	19.60	20.00	20.40	20.40	20.30	20.40	20.70
02/08/79	19.20	19.60	19.80	20.00	20.30	20.30	20.20	20.50
02/12/79	19.60	20.00	20.10	20.10	20.30	20.20	20.10	20.40
02/15/79	20.00	20.20	20.50	20.40	20.50	20.20	20.00	20.30
02/19/79	19.80	20.00	20.30	20.50	20.60	20.70	20.80	21.10
02/22/79	20.40	20.30	20.40	20.20	20.10	20.00	20.00	20.10
02/26/79	20.00	20.20	20.40	20.60	20.70	20.70	20.80	21.20
03/01/79	20.20	20.60	20.70	20.90	21.00	21.00	21.00	21.40
03/08/79	20.20	20.50	20.70	20.90	21.10	21.10	21.10	21.20
03/12/79	20.20	20.50	20.70	21.00	21.20	21.20	21.10	21.20
03/15/79	20.10	20.30	20.50	20.60	20.80	20.70	20.60	20.80
03/19/79	20.10	20.60	20.80	21.00	21.30	21.30	21.20	21.20
03/22/79	19.90	20.20	20.40	20.50	20.60	20.60	20.60	20.70
03/26/79	19.30	19.40	19.60	19.90	20.00	19.90	19.90	20.20
03/29/79	19.40	19.70	20.00	20.10	20.30	20.20	20.20	20.40
04/02/79	19.40	19.60	19.80	19.90	20.00	20.00	20.00	20.10
04/05/79	19.50	19.70	19.90	20.00	20.10	20.10	20.00	20.20
04/09/79	19.60	19.90	20.10	20.20	20.40	20.20	20.10	20.30
04/12/79	19.60	19.80	20.00	20.10	20.30	20.30	20.30	20.50
04/16/79	19.80	20.00	20.20	20.30	20.50	20.50	20.40	20.60
04/19/79	19.80	20.00	20.20	20.30	20.40	20.40	20.40	20.60
04/23/79	19.50	19.70	19.80	20.00	20.10	20.00	19.90	20.30
04/26/79	19.80	20.00	20.10	20.20	20.30	20.30	20.20	20.40
06/04/79	20.20	20.30	20.40	20.40	20.50	20.60	20.60	20.80
06/07/79	20.10	20.10	20.00	20.00	20.00	20.10	20.10	20.20
06/11/79	21.20	20.80	20.70	21.00	20.90	21.00	21.00	21.10
06/14/79	19.80	20.00	20.00	20.10	20.10	20.10	20.20	20.60
06/18/79	20.00	20.00	20.10	20.20	20.30	20.30	20.30	20.40
06/21/79	19.70	19.90	20.00	20.10	20.00	20.10	20.20	20.40
06/25/79	19.80	19.90	20.00	20.30	20.40	20.30	20.50	20.50
06/28/79	20.00	19.70	20.00	20.10	20.10	20.10	20.20	20.40
07/02/79	19.80	19.90	19.90	20.00	20.20	20.10	20.20	20.40
07/05/79	19.80	19.80	19.90	20.10	20.10	20.30	20.20	20.40
07/09/79	19.90	19.90	20.00	20.10	20.30	20.30	20.40	20.40
07/12/79	19.80	19.80	19.90	20.00	20.00	20.10	20.20	20.40
07/16/79	19.80	19.90	19.90	20.00	20.10	20.10	20.30	20.40
07/19/79	19.70	19.70	19.80	19.90	19.90	20.00	20.20	20.40
07/23/79	19.60	19.60	19.70	19.90	19.90	20.00	20.10	20.10
07/26/79	20.70	20.60	20.50	20.50	20.60	20.60	20.60	20.80
07/30/79	20.60	20.60	20.60	20.70	20.80	20.80	20.70	20.80

(CONTINUED)

TABLE B-31. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
08/02/79	20.80	20.80	20.80	20.90	20.90	20.80	20.70	20.80
08/06/79	20.50	20.40	20.30	20.40	20.50	20.40	20.40	20.60
08/09/79	20.60	20.50	20.40	20.40	20.50	20.60	20.60	20.60
08/13/79	20.50	20.20	20.50	20.70	20.60	20.50	20.70	20.90
08/16/79	20.60	20.40	20.50	20.60	20.60	20.70	20.80	20.90
08/20/79	20.40	20.30	20.30	20.20	20.10	20.30	20.40	20.60
08/23/79	20.60	20.50	20.40	20.60	20.80	20.80	20.90	20.80
08/27/79	20.80	20.60	20.40	20.50	20.60	20.60	20.70	20.80
08/30/79	20.70	20.60	20.40	20.30	20.40	20.40	20.50	20.60
09/06/79	20.20	20.30	20.40	20.40	20.20	20.10	20.00	20.10
09/10/79	20.40	20.50	20.30	20.20	20.20	20.10	20.00	20.10
09/13/79	20.50	20.40	20.30	20.30	20.10	20.00	20.10	20.10
09/17/79	20.40	20.50	20.60	20.60	20.50	20.40	20.10	20.10
09/20/79	20.40	20.50	20.60	20.50	20.40	20.10	20.10	20.20

TABLE B-32. WATER TEMPERATURE (DEGREES C) IN CHANNEL B AT 1500 HOURS

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
01/02/79	19.80	19.90	20.00	20.10	20.10	20.20	20.20	20.60
01/09/79	20.60	21.10	21.50	21.80	22.00	21.90	21.80	21.60
01/16/79	20.40	20.80	21.20	21.60	21.80	22.00	22.10	21.80
01/23/79	20.30	20.80	21.30	21.80	22.00	22.10	22.20	22.30
01/29/79	20.80	21.40	22.20	22.70	23.20	23.20	23.30	23.30
02/01/79	20.80	21.40	22.30	22.60	23.00	23.00	23.10	23.20
02/05/79	20.50	21.10	21.80	22.70	22.60	22.60	22.70	22.30
02/08/79	20.10	20.80	21.10	21.60	21.90	21.80	21.90	22.00
02/12/79	20.60	20.90	21.40	21.60	21.90	22.00	22.00	21.80
02/15/79	20.60	20.90	21.10	21.30	21.60	21.60	21.50	21.40
02/19/79	20.90	21.40	21.80	22.10	22.50	22.50	22.60	22.50
02/22/79	20.90	21.00	21.10	21.20	21.30	21.20	21.30	21.20
02/26/79	21.00	21.40	21.80	22.00	22.40	22.40	22.40	22.30
03/01/79	21.20	21.80	22.10	22.30	22.50	22.50	22.50	22.40
03/08/79	20.80	21.20	21.60	21.90	22.10	22.10	22.10	22.00
03/12/79	20.60	20.90	21.20	21.60	21.80	21.90	22.10	22.00
03/15/79	20.80	21.10	21.40	21.80	22.00	22.00	22.10	22.00
03/19/79	20.40	20.90	21.00	21.20	21.30	21.60	21.80	21.80
03/22/79	20.70	21.00	21.20	21.40	21.60	21.80	22.00	21.90
03/26/79	20.20	20.50	20.80	20.80	20.90	21.10	21.40	21.30
03/29/79	20.50	20.80	21.00	21.10	21.20	21.50	21.80	21.70
04/02/79	20.20	20.50	20.70	20.80	20.80	21.10	21.50	21.40
04/05/79	20.20	20.60	20.80	20.80	20.90	21.10	21.50	21.40
04/09/79	20.30	20.50	20.80	20.90	21.00	21.20	21.30	21.30
04/12/79	20.20	20.40	20.60	20.80	20.90	21.10	21.40	21.30
04/16/79	20.60	20.80	20.90	21.10	21.40	21.60	21.80	21.70
04/19/79	21.60	21.40	21.30	21.10	20.80	20.60	20.40	20.40
04/23/79	20.20	20.20	20.50	20.70	20.80	21.00	21.30	21.20
04/26/79	20.30	20.60	20.70	21.00	21.10	21.30	21.50	21.40
06/04/79	21.10	21.30	21.50	21.50	21.50	21.60	21.80	21.70
06/07/79	20.60	20.70	20.80	20.70	20.80	21.00	21.20	21.20
06/11/79	21.30	21.40	21.50	21.70	21.80	22.00	22.00	21.80
06/14/79	20.60	20.80	20.80	20.90	20.90	21.00	21.30	21.20
06/18/79	20.60	20.70	20.80	20.80	20.90	21.10	21.30	21.30
06/21/79	20.60	20.70	20.90	21.00	21.10	21.20	21.20	21.20
06/25/79	20.50	20.60	20.80	20.80	20.90	21.10	21.40	21.30
06/28/79	20.40	20.30	21.10	21.10	21.20	21.30	21.50	21.50
07/02/79	20.40	20.50	20.60	20.70	20.80	21.00	21.20	21.00
07/05/79	20.40	20.50	20.50	20.60	20.70	20.90	21.00	21.00
07/09/79	20.40	20.50	20.60	20.80	20.90	21.00	21.10	21.10
07/12/79	20.40	20.50	20.50	20.60	20.80	20.90	21.00	21.00
07/16/79	20.30	20.30	20.40	20.60	20.80	20.90	21.10	21.00
07/19/79	20.40	20.40	20.60	20.70	20.90	21.00	21.10	21.10
07/23/79	20.30	20.30	20.40	20.40	20.60	20.80	20.90	21.00
07/26/79	20.90	21.00	21.20	21.10	21.20	21.00	20.80	20.70
07/30/79	21.50	21.30	21.10	21.10	21.20	21.60	20.90	20.80

(CONTINUED)

TABLE B-32. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
08/02/79	21.40	21.20	21.00	21.10	21.10	21.00	20.80	20.70
08/06/79	21.20	21.00	20.80	20.80	20.90	20.90	20.90	20.80
08/09/79	21.00	21.00	21.20	21.10	21.10	21.30	21.40	21.40
08/13/79	21.00	21.00	21.30	21.30	21.30	21.50	21.70	21.60
08/16/79	21.00	21.20	21.30	21.50	21.70	21.50	21.40	21.50
08/20/79	21.00	21.00	21.20	21.20	21.30	21.30	21.20	21.40
08/23/79	21.00	21.20	21.30	21.50	21.70	21.60	21.40	21.50
08/27/79	21.10	21.00	21.10	21.30	21.60	21.70	21.60	21.40
08/30/79	21.10	21.10	21.00	21.30	21.40	21.60	21.70	21.80
09/06/79	20.30	20.40	20.50	20.60	20.60	20.40	20.20	20.10
09/10/79	20.40	20.50	20.40	20.30	20.50	20.60	20.80	21.00
09/13/79	20.40	20.40	20.50	20.40	20.30	20.50	20.70	20.90
09/17/79	20.40	20.60	20.70	20.60	20.40	20.40	20.60	20.70
09/20/79	20.40	20.50	20.50	20.50	20.40	20.40	20.60	20.80

TABLE B-33. TKN (MG/L) IN CHANNEL A AT 0800 HOURS

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79			1.00	.90	.30	.15	.14	.05
02/09/79			1.10		.40		.32	
02/13/79			1.00		.75		.65	
02/16/79			1.00	.80	.90	1.10	.50	.50
02/20/79			1.10	1.10	.60	.60	.50	.50
02/23/79			1.20	1.10	.80	.70	.70	1.00
02/27/79			1.00	.80	.50	.60	.50	.60
03/02/79			.90	.70	.40	.40	.50	.40
03/05/79			1.00	1.00	1.50	1.10	1.20	1.20
03/09/79			1.20	1.10	1.20	.70	.60	.50
03/13/79			1.00	.70	.40	.40	.60	.60
03/20/79			.90	.60	.50	.90	.40	.60
03/23/79			1.00	.60	.30	.30	.40	1.30
03/27/79			1.20	.70	.30	.30	.30	.30
03/30/79			1.30	1.00	.60	.80	.60	.50
04/03/79			1.28	.98	.58	.48	.42	.45
04/06/79			1.20	1.00	.80	.70	.60	.40
04/10/79			1.20	.80	.60	.50	.60	.60
04/13/79			1.10	.80	.60	.60	.50	.50
04/17/79			1.00	.60	.60	.40	.40	.40
04/20/79			1.30	1.20	1.00	.80	.60	.50
04/24/79			.80	.50	.40	.50	.60	.60
04/27/79			1.30	1.20	.90	.80	.70	.50
05/01/79			.80	.50	.60	.50	.70	.70
06/22/79			1.00	.80	.70	.30	.30	.30
06/26/79			1.00	.80	.70	.80	.80	.80
06/29/79			1.20	.90	.80	.80	.70	.80
07/03/79			1.20	.90	.60	.50	.50	.60
07/06/79			1.10	1.00	.90	.90	.80	.40
07/10/79			1.20	1.00	.60	.60	.60	.60
07/13/79			1.20	1.00	.50	.60	.50	.50
07/17/79			1.10	.90	.30	.40	.40	.40
07/20/79			1.00	.80	.30	.30	.50	.40
07/24/79			1.00	.90	.30	.40	.60	.60
07/27/79			1.00	1.00	.40	.40	.50	.40
07/31/79			1.10	.90	.30	.30	.50	.50
08/03/79			1.20	1.30	.80	.60	.60	.50
08/07/79			1.10	.90	.30	.30	.70	.70
08/10/79			1.20	1.10	.70	.60	.60	.70
08/14/79			1.10	.90	.40	.40	.40	.40
08/17/79			1.30	1.20	.80	.70	.70	.60
08/21/79			1.10	.90	.40	.60	.40	.50
08/24/79			1.20	1.30	.90	.80	.70	.50
08/28/79			1.20	1.20	.70	.70	.60	.70
08/31/79			1.20	1.20	.90	.60	.60	.40
09/04/79			1.30	1.30	1.20	1.50	1.70	1.80

(CONTINUED)

TABLE B-33. (CONTINUED)

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
09/07/79			1.20	1.10	.90	1.00	1.20	1.30
09/11/79			1.30	1.20	1.00	1.00	.90	.80
09/18/79			1.20	1.20	1.00	1.20	1.40	1.60
09/21/79			1.20	1.00	.70	.70	.80	1.10
09/24/79			1.10	1.10	1.00	1.00	1.10	1.00

TABLE B-34. TKN (MG/L) IN CHANNEL B AT 0800 HOURS

			CSTR					
DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79			1.02	.78	.08	.00	.08	.18
02/09/79			1.08		.40		.28	
02/13/79			.98		.52		.35	
02/16/79			.90	.80	.50	.30	.50	.60
02/20/79			.80	.70	.50	.40		.40
02/23/79			1.10	1.00	.80	.60	.70	.70
02/27/79			.80	.60	.50	.30	.30	.40
03/02/79			.60	.50	.40	.60	.50	.30
03/05/79			.90	.70	.70	.90	1.00	1.10
03/09/79			.70	.50	.20	.30	.40	.40
03/13/79			.70	.40	.30	.50	.80	1.20
03/20/79			.90	.50	.20	.40	.60	.70
03/23/79			.70	.50	.50	.50	.60	.70
03/27/79			.80	.60	.20	.40	.40	.50
03/30/79			1.20	1.00	.80	.80	.80	.60
04/03/79			.70	.48	.35	.40	.40	.48
04/06/79			1.00	1.00	.80	.80	.60	.50
04/10/79			.80	.60	.60	.60	.60	.60
04/13/79			.70	.60	.50	.50	.50	.50
04/17/79			.60	.40	.30	.30	.40	.40
04/20/79			.80	.80	.50	.50	.50	.30
04/24/79			.60	.40	.40	.40	.40	.40
04/27/79			1.40	1.20	.70	.60	.60	.50
05/01/79			1.40	1.50	1.80	1.70	1.70	1.80
06/22/79			1.20	1.20	.90	.70	.80	.30
06/26/79			1.30	1.10	.90	.90	1.00	1.20
06/29/79			1.00	.90	.70	.80	.80	.80
07/03/79			1.10	1.00	.50	.40	.30	.40
07/06/79			1.30	1.20	1.00	.80	.60	.30
07/10/79			1.10	1.20	.70	.60	.70	.70
07/13/79			1.10	1.20	.80	.70	.60	.60
07/17/79			1.00	1.10				
07/20/79			1.00	1.00	.50	.40	.40	.30
07/24/79			1.10	1.10	.60	.60	.50	.50
07/27/79				1.00	.60	.40	.40	.40
07/31/79			1.00	.80	.40	.40	.30	.40
08/03/79			1.10	1.20	.80	.90	1.00	.80
08/07/79			1.00	.80	.30	.40	.50	.50
08/10/79			1.20	1.20	.70	.80	.80	.60
08/14/79			1.20	.90	.50	.50	.40	.40
08/17/79			1.10	1.10	.60	.70	.60	.40
08/21/79			1.00	.80	.30	.30	.40	.40
08/24/79			1.10	1.30	.70	.70	.60	.40
08/28/79			1.00	.90	.30	.30	.50	.60
08/31/79			1.10	1.10	.50	.80	.70	.60
09/04/79			1.90	2.20	2.40	2.30	2.70	2.60

(CONTINUED)

TABLE B-34. (CONTINUED)

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
09/07/79			1.20	1.10	.80	1.30	1.50	1.80
09/11/79			1.40	1.40	1.40	1.50	1.80	1.80
09/18/79			1.20	1.00	.80	.70	.70	.60
09/21/79			1.20	1.30	.90	.70	.70	.80
09/24/79			1.30	1.10	.60	.60	.60	.70

TABLE B-35. TKN (MG/L) IN CHANNEL A AT 1500 HOURS

DATE			CSTR					
	A1	A2	A3	A4	A5	A6	A7	A8
02/05/79			.52	.38	.20	.10	.05	.45
02/08/79			.72		.42		.40	
02/12/79			.95		.65		.50	
02/15/79			.70	.70	.40	.40	.50	.60
02/19/79			.80	.60	.50	.50	.40	.40
02/22/79			1.40	1.20		.90	.90	1.30
02/26/79			.80	.60	.40	.50	.60	.40
03/01/79			.70	.50	.30	.30	.40	.30
03/08/79			1.10	.90	.40	.30	.40	.40
03/12/79			.80	.50	.40	.30	.40	.60
03/19/79			.60	.30	.50	.50	.90	.60
03/22/79			.60	.40	.30	.30	.30	.30
03/26/79			.80	.50	.30	.30	.30	.40
03/29/79			.90	.80	.40	.30	.30	.30
04/02/79			1.08	.62	.30	.32	.40	.35
04/05/79			1.30	.90	.50	.40	.30	.30
04/09/79			1.10	.70	.50	.40	.40	.40
04/12/79			.80	.60	.20	.30	.20	.30
04/16/79			.80	.40	.40	.50	.50	.40
04/19/79			1.00	1.00	.50	.40	.50	.60
04/23/79			.60	.60	.50	.60	.60	.60
04/26/79			1.10	.90	.30	.40	.50	.50
06/21/79			.60	.60	.40	.30	.30	.20
06/25/79			.80	.70	.70	.70	.70	.60
06/28/79			.60	.60	.60	.80	.80	.80
07/02/79			.90	.70	.50	.60	.60	.70
07/05/79			1.00	.80	.80	.60	.60	.50
07/09/79			.90	1.00	.60	.70	.60	.60
07/12/79			.90	.70	.50	.40	.50	.40
07/16/79			1.00	.70	.30	.40	.50	.40
07/19/79			.80	.60	.20	.30	.50	.40
07/23/79			.80	.70	.30	.30	.50	.60
07/26/79			.80	.90	.40	.30	.50	.40
07/30/79			.80	.80	.30	.40	.50	.50
08/02/79			1.20	1.20	.50	.60	.40	.60
08/06/79			.80	.60	.30	.40		.50
08/09/79			.90	.80	.50	.40	.40	.40
08/13/79			.80	.60	.40	.40	.60	.50
08/16/79			1.00	1.00	.40	.40	.40	.40
08/20/79			.80	.60	.30	.40	.40	.50
08/23/79			1.10	1.10	.60	.40	.40	.40
08/27/79			1.00	1.00	.60	.60	.50	.60
08/30/79			1.10	1.00	.70	.50	.40	.40
09/06/79			.80	.90	.90	1.10	1.10	1.20
09/10/79			1.00	1.10	.90	.80	.70	.70
09/17/79			.90	1.00	1.00	1.10	1.20	1.10
09/20/79			1.00	1.10	.90	1.00	1.00	1.20

TABLE B-36. TKN (MG/L) IN CHANNEL B AT 1500 HOURS

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/05/79			.60	.42	.12	.18	.10	.12
02/08/79			.68		.35		.42	
02/12/79			.75		.50		.28	
02/15/79			.70	.80	1.90	.50	.40	.40
02/19/79			.50	.30	.40	.40	.50	.50
02/22/79			1.20	1.40	1.30	1.00	.80	.60
02/26/79			.80	.40	.60	.40	.40	.30
03/01/79			.50	.30	.70	.30	.30	.20
03/08/79			.90	.40	.40	.30	.40	.30
03/12/79			.60	.30	.20	.30	.40	.40
03/19/79			.60	.50	.50	.40	.60	.70
03/22/79			.60	.40	.20	.70	.30	.40
03/26/79			.70	.40	.30	.40	.30	.40
03/29/79			1.10	1.00	.90	.50	.30	.30
04/02/79			.55	.30	.38	.45	.38	.35
04/05/79			.70	.80	.40	.40	.30	.30
04/09/79			.50	.50	.50	.60	.60	.50
04/12/79			.60	.40	.30	.40	.40	.40
04/16/79			.50	.40	.40	.40	.40	.40
04/19/79			.60	.50	.30	.40	.40	.40
04/23/79			.60	.40	.40	.40	.50	.40
04/26/79			.90	.70	.40	.40	.40	.40
06/21/79			.90	1.00	.70	.70	.30	.40
06/25/79			.80	.70	.80	1.00	1.10	1.20
06/28/79			.60	.50	.80	.90	.90	1.00
07/02/79			.80	.80	.60	.50	.40	.40
07/05/79			1.20	1.00	.80	.40	.30	.30
07/09/79			1.00	.70	.50	.60	.70	.90
07/12/79			1.00	.90	.60	.60	.60	.60
07/16/79			.80	.80	.60	.70	.60	.60
07/19/79			.80	.70	.20	.30	.30	.30
07/23/79			.90	.80	.40	.40	.50	.30
07/26/79			.70	.70	.40	.40	.40	.40
07/30/79			.80	.50	.50	.30	.40	.40
08/02/79			1.00	1.00	.80	.80	.70	.60
08/06/79			.70	.30	.40	.50	.60	.60
08/09/79			1.00	.80	.40	.50	.50	.60
08/13/79			.80	.60	.40	.50	.40	.60
08/16/79			1.00	.90	.40	.50	.40	.40
08/20/79			.70	.50	.20	.40	.50	.40
08/23/79			1.00	1.00	.40	.50	.30	.30
08/27/79			.50	.40	.30	.50	.50	.70
08/30/79			.80	.70	.40	.50	.30	.30
09/06/79			1.00	.90	1.00	1.40	1.90	2.30
09/10/79			1.30	1.40	1.60	1.50	1.60	1.40
09/17/79			.80	.70	.60	.60	.50	.50
09/20/79			1.00	1.00	.70	.70	.80	.60

TABLE B-37. METHYL PARATHION (UG/L) IN THE WATER OF CHANNEL A

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79	3.370	2.990	2.500	2.680	1.670	1.730	1.190	1.010
02/20/79	27.000	24.600	17.600	15.700	10.900	10.600	9.900	7.330
03/05/79	37.400	34.700		24.200	17.900	15.200	12.100	9.240
03/27/79	37.800		29.000	24.800		22.800	16.900	15.100
04/10/79	36.800	29.600	25.900	19.800	15.200	12.600	8.300	5.120
07/10/79	5.720	5.480	4.520	4.120	3.520	3.120	2.960	2.800
07/24/79	48.900	47.400	41.400	38.100	33.000	25.500	19.900	14.100
08/07/79	49.500	45.900	39.300	36.000	27.300	20.400	16.500	11.700
08/21/79	45.900	43.800	39.000	32.400	30.600	22.500	18.600	14.100
09/24/79	47.400	45.900	44.100	40.500	33.000	27.900	21.000	17.100

TABLE B-38. METHYL PARATHION (UG/L) IN THE WATER OF CHANNEL B

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79	3.860	3.480	2.620	2.500	1.340	1.190	.980	.870
02/20/79	32.300		28.400	22.000	12.300	11.200	6.320	5.140
03/05/79	32.800	31.800	26.600	22.100	20.300	13.800	9.350	6.210
03/27/79		28.900		26.300	14.100	9.250	4.870	2.620
04/10/79	40.000		30.900	24.100	13.900	13.900	2.500	2.050
07/10/79	5.080	5.000	4.880	4.880	4.520	3.880	3.880	3.720
07/24/79	49.200	45.600	39.900	33.000	21.900	15.600	10.100	8.400
08/07/79	49.200	45.000	38.700	34.800	27.900	20.700	17.400	14.100
08/21/79	45.600	41.800	33.900	31.200	25.500	21.000	16.200	13.500
09/24/79	47.800	45.900	40.300	34.400	27.600	23.100	21.000	17.400

TABLE B-39. ATP (NG/L) IN THE WATER OF CHANNEL A

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/20/79	.0	.0	1100.0	1600.0	7300.0	6900.0	700.0	200.0
03/05/79	.0	.0	700.0	1200.0	3600.0	2600.0	2900.0	5300.0
03/27/79	6.6	6.9	326.0	314.0	722.0	648.0	410.0	212.0
04/10/79	.0	.0	1800.0	820.0	1800.0	1500.0	1200.0	2300.0
07/10/79			3100.0	1500.0	2800.0	2400.0	2100.0	1000.0
07/24/79			890.0	1200.0	1400.0	2900.0	820.0	770.0
08/07/79			1300.0	2300.0	650.0	1300.0	220.0	500.0
08/21/79			2000.0	2300.0	460.0	720.0	1600.0	990.0
09/24/79			1700.0	1200.0	1400.0	1700.0	2500.0	1500.0

TABLE B-40. ATP (NG/L) IN THE WATER OF CHANNEL B

				CSTR				
DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/20/79	.0	10.0	1600.0	4600.0	2600.0	2300.0	700.0	600.0
03/05/79	.0	.0	2100.0	1800.0	2900.0	2000.0	2100.0	300.0
03/27/79	6.3	6.8	914.0	1684.0	1028.0	970.0	314.0	450.0
04/10/79	.0	.0	1400.0	910.0	960.0	1200.0	920.0	8300.0
07/10/79			7200.0	4200.0	2900.0	3300.0	2300.0	630.0
07/24/79			2000.0	1900.0	410.0	520.0	430.0	610.0
08/07/79			390.0	620.0	3000.0	2100.0	1400.0	1200.0
08/21/79			460.0	1000.0	2700.0	6800.0	2700.0	3800.0
09/24/79			2500.0	2600.0	450.0	400.0	600.0	410.0

TABLE B-41. CHLOROPHYLL A (UG/L) IN THE WATER OF CHANNEL A

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79	.00	.00	34.50	29.10	12.90	11.50	11.50	12.90
02/20/79	.00	.00	23.60	20.90	10.80	10.10	10.80	15.50
03/05/79	.00	.00	30.70	12.30	23.90	11.60	13.70	10.90
03/27/79	.10	.00	33.90	4.30	5.00	9.30	17.90	9.90
04/10/79	.20	.20	28.90	8.90	28.10	57.80	105.10	11.90
07/10/79			7.80	5.40	11.50	12.70	8.40	6.60
07/24/79			7.10	4.60	4.90	6.30	11.40	11.40
08/07/79			8.00	5.80	5.20	4.30	4.30	5.60
08/21/79			4.40	2.60	2.50	3.20	1.20	1.30
09/24/79			14.90	14.00	20.60	27.10	43.30	56.00

TABLE B-42. CHLOROPHYLL A (UG/L) IN THE WATER OF CHANNEL B

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79	.00	.00	13.40	15.60	14.90	8.10	14.20	11.50
02/20/79	.00	.00	16.90	19.60	14.20	15.50	11.50	15.50
03/05/79	.00	.00	23.20	12.30	17.10	10.90	8.88	10.20
03/27/79	.20	.30	2.30	2.10	15.30	2.80	6.50	5.30
04/10/79	.20	.20	6.40	6.80	8.50	18.40	32.90	149.80
07/10/79			60.30	36.20	60.30	42.20	36.20	30.20
07/24/79			5.10	5.70	8.90	10.10	8.20	17.80
08/07/79	2.80	1.90	3.50	1.90	3.50	2.70	6.10	9.30
08/21/79			1.50	1.30	1.40	1.20	1.30	5.00
09/24/79			32.40	43.30	42.00	41.10	33.20	23.20

TABLE B-43. BACTERIA (CFU/ML) IN THE WATER OF CHANNEL A

	CSTR							
DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79	6.7E3	4.2E1	5.5E4	4.2E4	1.8E4	3.3E4	1.6E4	4.2E4
02/20/79	3.5E3	2.8E3	2.4E3	3.7E3	1.6E4	5.5E3	1.2E4	1.8E4
03/05/79	1.7E3	7.4E2	8.0E4	6.9E4	6.7E4	5.5E4	6.8E4	4.7E4
03/27/79	3.6E2	1.2E2	1.1E4	4.4E3	1.0E4	1.2E4	9.8E3	9.1E3
04/10/79	7.5E2	3.1E2	1.1E5	8.6E4	1.0E5	1.3E5	4.1E4	3.2E4
07/10/79	2.2E4	5.3E4	3.5E5	1.4E5	2.0E6	3.2E6	1.5E6	7.0E5
07/24/79	1.3E4	2.5E3	1.2E5	1.0E5	6.6E5	6.1E5	6.2E5	1.9E5
08/07/79	1.1E4	3.2E2	1.5E6	1.0E6	1.1E6	8.4E5	3.5E5	1.7E5
08/21/79	2.2E3	1.6E2	3.0E4	3.1E4	3.0E6	2.9E6	1.8E5	1.1E5
09/24/79	5.5E3	4.5E3	5.2E6	5.5E6	3.6E6	8.1E5	1.2E6	5.4E5

TABLE B-44. BACTERIA (CFU/ML) IN THE WATER OF CHANNEL B

	CSTR							
DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79	1.4E3	9.3E1	3.3E4	3.4E4	3.6E4	5.2E4	1.1E5	1.2E4
02/20/79	7.8E2	3.2E3	2.8E3	3.4E3	6.3E4	6.2E4	5.4E4	1.3E5
03/05/79	1.6E3	6.7E2	9.7E4	1.1E5	9.3E4	6.3E4	4.8E4	3.8E4
03/27/79	3.0E2	1.5E2	1.2E4	8.7E3	1.2E4	8.5E3	9.4E3	7.6E3
04/10/79	3.8E2	4.3E2	3.9E4	3.1E4	3.4E4	5.5E4	4.6E4	3.8E4
07/10/79	1.1E3	2.3E2	3.5E5	4.5E5	1.3E6	8.0E5	6.7E5	5.2E5
07/24/79	1.7E3	2.3E2	5.5E5	8.3E5	6.6E5	1.3E6	9.8E5	9.3E5
08/07/79	8.7E2	5.9E1	3.0E4	3.0E4	2.9E5	1.5E5	3.5E4	5.7E4
08/21/79	4.5E2	3.5E2	7.0E4	1.3E5	5.6E4	4.8E4	1.4E5	6.5E4
09/24/79	7.3E2	5.0E4	6.3E6	3.9E6	2.2E7	1.8E7	5.0E6	2.3E7

TABLE B-45. METHYL PARATHION (NG/G) IN THE SEDIMENTS OF CHANNEL A AND CHANNEL B

CSTR [1]

DATE	A6S	A6D	A7S	A7D	B6S	B6D	B7S	B7D
02/06/79	.00	.00	.00	.00	.00	.00	.00	.00
02/06/79	.00	.00	.00	.00	.00	.00	.00	.00
02/20/79	.00	.00	.00	.00	.00	.00	.00	.00
03/05/79	.00	.00	.00	.00	.00	.00	.00	.00
03/27/79	.00	.00	.00	.00	.00	.00	.00	.00
04/10/79	280.00	.00	21.60	.00	.00	.00	1.30	.00
04/10/79	.00	.00	.00	.00	.00	.00	2.23	.00
07/10/79	.00	.00	.00	.00	.00	.00	.00	.00
07/10/79	.00	.00	.00	.00	.00	.00	.00	.00
07/24/79	.00	.00	.00	.00	.00	.00	.00	.00
08/07/79	.00	.00	.00	.00	.00	.00	.00	.00
08/21/79	.00	.00	.00	.00	.00	.00	.00	.00
08/21/79	.00	.00	.00	.00	.00	.00	.00	.00
09/24/79		.00		.00		.00	.00	

[1] S designates shallow sediments (0.5 cm deep)
D designates deep sediments (2.5 cm deep)

TABLE B-46. ASH-FREE DRY WEIGHT (MG/G) IN THE SEDIMENTS OF CHANNEL A AND CHANNEL B

CSTR[1]

DATE	A6S	A6D	A7S	A7D	B6S	B6D	B7S	B7D
02/06/79	53.82	50.41	21.83	32.29	69.39	57.23	32.61	15.27
02/06/79	59.74	50.76	22.97	18.83	77.12	59.67	25.76	14.27
02/20/79	55.98	67.72	14.17	13.76	54.87	71.26	28.49	22.27
03/05/79	41.25	49.77	28.17	11.83	64.12	53.87	41.80	11.51
03/27/79	16.39	62.10	51.12	15.39	61.57	58.39	19.64	10.43
04/10/79	58.50	66.55	18.93	18.21	63.68	57.02	19.88	13.32
04/10/79	41.52	63.79	16.68	16.97	55.63	55.68	24.55	14.14
05/02/79	77.58	80.00	16.08	8.01	70.60	72.28	10.30	6.35
07/10/79	42.71	76.81	13.72	13.41	63.86	60.83	14.82	11.61
07/10/79	40.74	62.36	11.52	13.18	60.71	64.45	13.21	11.79
07/24/79	47.77	78.22	8.49	10.05	54.01	57.65	10.52	6.89
08/07/79	35.04	53.05	5.56	6.67	55.32	60.75	7.43	5.98
08/21/79	37.75	57.44	7.77	10.69	47.60	60.94	8.37	12.36
08/21/79	37.05	44.43	7.92	11.69	48.18	56.87		21.71
09/24/79		61.19		7.94		72.07		8.01
09/24/79		62.46		5.79		68.34		

[1] S designates shallow sediments (0.5 cm deep)
D designates deep sediments (2.5 cm deep)

TABLE B-47. ATP (NG/G) IN THE SEDIMENTS OF CHANNEL A AND CHANNEL B

CSTR [1]

DATE	A6S	A6D	A7S	A7D	B6S	B6D	B7S	B7D
02/20/79	39.	174.	13.	22.	6.	6.	96.	34.
03/05/79	204.	12.	22.	17.	97.	12.	171.	58.
03/27/79	781.	104.	1427.	227.	308.	169.	261.	161.
04/10/79	582.	103.	296.	412.	432.	132.	191.	134.
04/10/79	1302.	79.	548.	839.	348.	118.	288.	134.
07/10/79	760.	144.	956.	539.	317.	142.	1697.	779.
07/10/79	606.	210.	916.	145.	143.	109.	1300.	675.
07/24/79	42.	25.	23.	39.	60.	12.	119.	53.
08/07/79	235.	79.	112.	125.	1156.	616.	454.	155.
08/21/79	323.	241.	182.	167.	992.	253.	300.	182.
08/21/79	357.	220.	310.	156.	706.	218.	226.	109.
09/24/79		96.		325.		89.		323.
09/24/79		97.		336.		78.		317.

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[1] S designates shallow sediments (0.5 cm deep)
D designates deep sediments (2.5 cm deep)

TABLE B-48. CHLOROPHYLL A (UG/G) IN THE SEDIMENTS OF CHANNEL A AND CHANNEL B

	CSTR[1]							
DATE	A6S	A6D	A7S	A7D	B6S	B6D	B7S	B7D
02/06/79	3.3	1.4	17.1	5.5	5.6	4.9	13.2	6.8
02/06/79	3.7	1.8	11.1	6.0	3.2	4.5	14.0	5.0
02/20/79	8.6	14.3	25.6	7.2	10.3	17.9	28.9	11.9
03/05/79	26.3	18.0	12.3	7.5	10.6	18.2	12.0	7.9
03/27/79	39.6	2.7	18.3	17.8	14.8	9.7	18.0	2.7
04/10/79	22.1	13.5	17.9	12.1	15.7	7.3	21.0	9.9
04/10/79	31.2	8.1	8.2	8.3	14.4	6.5	45.0	12.8
07/10/79	8.0	2.8	24.8	13.2	4.0	2.0	28.9	16.4
07/10/79	13.9	2.0	16.8	1.6	2.9	1.6	22.5	11.9
07/24/79	2.2	.7	.9	.7	3.4	.8	1.2	.6
08/07/79	1.9	.4	.4	.2	1.4	.6	1.8	.3
08/21/79	1.1	.4	.4	.2	.5	.5	.4	.3
08/21/79	1.2	.5	.3	.3	.5	.5	.3	.3
09/24/79		.6		1.4		.4		1.5
09/24/79		.5		2.1		.5		2.1

[1] S designates shallow sediments (0.5 cm deep)
D designates deep sediments (2.5 cm deep)

TABLE B-49. BACTERIA (CFU/G) IN THE SEDIMENTS OF CHANNEL A AND CHANNEL B

	CSTR[1]							
DATE	A6S	A6D	A7S	A7D	B6S	B6D	B7S	B7D
02/06/79	5.8E6	2.0E6	3.8E6	2.4E6	2.7E6	4.1E6	5.7E6	1.2E6
02/06/79	8.9E6	2.3E6	4.7E6	6.4E5	6.4E6	4.5E6	1.0E7	1.2E6
02/20/79	7.0E6	3.7E6	5.6E5	8.0E5	1.3E6	1.6E6	1.2E6	8.7E5
03/05/79	1.8E7	6.5E6	1.9E6	1.1E7	1.3E7	8.2E6	5.1E5	1.1E6
03/27/79	5.5E6	1.9E6	4.2E6	1.1E6	1.3E7	1.8E6	4.3E6	1.1E6
04/10/79	5.1E6	1.6E6	6.4E6	1.6E6	3.8E6	1.8E6	7.9E6	5.0E6
04/10/79	4.3E6	2.6E6	1.0E7	1.2E7	4.2E6	4.5E6	2.7E6	2.3E6
05/02/79	3.2E6	1.4E6	2.1E6	7.7E5	1.4E6	8.3E5	1.5E6	1.4E6
07/10/79	5.6E6	4.2E6	6.1E6	2.4E6	6.4E6	3.6E6	5.0E7	3.3E7
07/10/79	5.7E6	3.2E6	4.0E6	5.5E6	5.6E6	6.0E6	4.1E7	2.9E7
07/24/79	4.6E6	3.3E6	3.9E5	2.4E6	6.5E6	4.2E6	8.3E5	3.4E5
08/07/79	3.6E6	3.4E6	6.3E5	3.8E5	3.7E6	3.4E6	5.2E5	6.8E5
08/21/79	4.2E6	1.3E6	1.7E6	5.3E5	3.9E6	2.8E6	3.8E5	1.3E5
08/21/79	4.5E6	2.3E6	8.7E5	4.5E5	4.3E6	3.6E6	1.7E5	2.1E5
09/24/79		3.2E6		2.4E6		2.8E6		2.0E6

[1] S designates shallow sediments (0.5 cm deep)
D designates deep sediments (2.5 cm deep)

TABLE B-50. METHYL PARATHION (NG/CM**2) IN THE AUFWUCHS OF CHANNEL A

	CSTR					
DATE	A3	A4	A5	A6	A7	A8
02/06/79	.000	.000	.000	.000	.000	.000
02/20/79	4.190	2.040	1.650	3.110	1.040	.000
03/05/79	3.840	2.790	1.510	1.070	1.540	.000
03/27/79	4.160	.890	.000	.000	.000	.000
04/10/79	5.220	3.040	.000	.000	.000	.000
05/02/79						
07/10/79	.000	.000	.351	1.430	.676	.468
07/24/79	13.000	8.340	7.860	5.770	4.700	1.070
08/07/79	15.800	6.170	7.260	4.710	4.330	3.500
08/21/79	20.800	12.100	11.400	5.140	3.850	1.650
09/24/79						

TABLE B-51. METHYL PARATHION (NG/CM**2) IN THE AUFWUCHS OF CHANNEL B

	CSTR					
DATE	B3	B4	B5	B6	B7	B8
02/06/79	.000	.000	.000	.000	.000	.000
02/20/79	13.370	14.640	1.040	.940	.000	.000
03/05/79	4.320	3.070	.800	1.840	.600	.000
03/27/79	6.450	1.620	.000	.000	.000	.000
04/10/79	6.760	2.320	.000	.000	.000	.000
05/02/79						
07/10/79	1.140	1.290	.714	.821	.566	.684
07/24/79	11.600	9.780	6.910	4.920	2.930	1.600
08/07/79	15.400	10.000	21.500	4.370	4.270	1.690
08/21/79	13.000	8.010	8.060	2.680	8.900	1.390
09/24/79						

TABLE B-52. TOTAL ORGANIC CARBON (MG/CM**2) IN THE AUFWUCHS OF CHANNEL A

	CSTR					
DATE	A3	A4	A5	A6	A7	A8
02/06/79	.088	.158	.119	.271	.188	.201
02/20/79	.276	.163	.158	.245	.077	.128
03/05/79	.248	.188	.250	.180	.149	.223
03/27/79	.200	.290	.120	.100	.081	.024
04/10/79	.022	.220	.840	.740	.490	.250
05/02/79	.970	.960	.970	.380	.390	.770
07/10/79	.300	.170	.056	.043	.100	.046
07/24/79	.470	.120	.130	.100	.210	.100
08/07/79	.620	.480	.800	.340	.390	.250
08/21/79	.434	.316	.493	.329	.355	.331
09/24/79	.630	.690	.800	.400	.690	.870

TABLE B-53. TOTAL ORGANIC CARBON (MG/CM**2) IN THE AUFWUCHS OF CHANNEL B

			CSTR			
DATE	B3	B4	B5	B6	B7	B8
02/06/79	.316	.326	.208	.333	.169	.254
02/20/79	.278	.224	.069	.134	.133	.155
03/05/79	.215	.191	.143	.204	.192	.111
03/27/79	.200	.210	.094	.160	.140	.120
04/10/79	.470	.570	.600	.540	.370	.380
05/02/79	1.530	.770	.580	.190	.390	.390
07/10/79	.041	.092	.069	.043	.030	.088
07/24/79	.071	.240	.370	.240	.300	.150
08/07/79	.350	.210	.280	.230	.280	.190
08/21/79	.636	.325	.512	.317	.465	.302
09/24/79	1.500	1.220	1.600	1.240	.740	.810

TABLE B-54. ASH-FREE DRY WEIGHT (MG/CM**2) OF THE AUFWUCHS OF CHANNEL A

			CSTR			
DATE	A3	A4	A5	A6	A7	A8
02/06/79	.540	.500	.440	.820	.570	.510
02/20/79	1.500	.900	.830	1.000	.620	.770
03/05/79	1.400	1.100	1.600	1.100	.920	1.100
03/27/79						
04/10/79	1.370	1.840	1.380	1.370	1.690	.750
05/02/79	3.300	2.810	4.320	2.580	2.300	2.230
05/02/79	3.920	3.250	5.060	3.740	4.300	2.650
07/10/79	.490	.580	.150	.180	.290	.092
07/10/79		.540	.140		.290	
07/24/79	1.720	1.010	.960	.750	.720	.440
07/24/79	.940	.730	.990	.640	1.120	.330
08/07/79	1.330	1.100	1.580	.900	.890	.670
08/21/79	1.350	1.150	1.660	.602	.948	.685
09/24/79	1.640	1.460	2.280	1.740	2.160	2.000
09/24/79	1.630	1.480	2.580	1.690	2.200	2.020

TABLE B-55. ASH-FREE DRY WEIGHT (MG/CM**2) OF THE AUFWUCHS OF CHANNEL B

	CSTR					
DATE	B3	B4	B5	B6	B7	B8
02/06/79	.670	.760	.610	.980	.490	.720
02/20/79	1.400	1.300	.580	1.000	.920	1.100
03/05/79	1.700	1.200	.570	1.500	1.200	1.100
03/27/79	1.800	1.900	2.390	2.350	1.640	1.730
04/10/79	1.740	2.120	2.230	1.960	1.810	1.780
05/02/79	3.990	2.440	4.540	2.180	2.030	2.430
05/02/79	4.530	2.530	4.630	3.070	2.840	2.640
07/10/79	.200	.340	.210	.140	.160	.220
07/10/79	.180	.350	.210			.200
07/24/79	.420	.790	1.060	.650	.680	.460
07/24/79	.410	.760	1.050	.540	.570	.380
08/07/79	1.180	.860	1.310	.840	1.170	.580
08/21/79	1.180	1.060	1.780	1.110	1.620	1.030
09/24/79	2.630	2.120	3.190	2.230	1.680	1.870
09/24/79	2.680	2.230	3.200	2.350	1.800	1.870

TABLE B-56. ATP (NG/CM**2) IN THE AUFWUCHS OF CHANNEL A

CSTR

DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79			270.0	212.0	105.0	9.0	1.0	1.0
02/20/79			506.0	357.0	124.0	74.0	22.0	19.0
03/05/79			770.0	550.0	212.0	39.0	81.0	23.0
03/27/79			226.0	275.0	252.0	13.4	88.0	39.0
04/10/79			288.0	531.0	250.0	200.0	174.0	67.0
05/02/79			830.0	688.0	579.0	401.0	463.0	288.0
05/02/79			830.0	649.0	579.0	420.0	425.0	326.0
07/10/79			552.0	388.0	168.0	100.0	214.0	43.0
07/24/79			1700.0	980.0	540.0	380.0	520.0	260.0
08/07/79			1100.0	1100.0	350.0	360.0	690.0	370.0
08/21/79	2.2	2.0	1300.0	1300.0	680.0	280.0	1000.0	750.0
09/24/79			1200.0	817.0	1250.0	817.0	2650.0	2200.0
09/24/79			1200.0	805.0	1140.0	840.0	2650.0	2200.0

TABLE B-57. ATP (NG/CM**2) IN THE AUFWUCHS OF CHANNEL B

				CSTR				
DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79			185.0	328.0	8.0	28.0	.2	1.0
02/20/79			618.0	560.0	100.0	101.0	32.0	19.0
03/05/79			458.0	466.0	88.0	73.0	67.0	4.4
03/27/79			536.0	485.0	44.0	247.0	168.0	46.0
04/10/79			444.0	483.0	394.0	179.0	163.0	89.0
05/02/79			860.0	461.0	830.0	579.0	425.0	407.0
05/02/79			1184.0	346.0	1235.0	637.0	386.0	388.0
07/10/79			150.0	262.0	78.0	38.0	60.0	70.0
07/24/79			390.0	840.0	820.0	450.0	390.0	240.0
08/07/79			520.0	790.0	170.0	260.0	380.0	130.0
08/21/79	1.0	1.0	2000.0	2200.0	1500.0	410.0	3400.0	1200.0
09/24/79			1730.0	1620.0	1129.0	690.0	114.0	986.0
09/24/79			1500.0	1620.0	1250.0	656.0	958.0	986.0

TABLE B-58. CHLOROPHYLL A (UG/CM**2)
OF THE AUFWUCHS OF CHANNEL A

CSTR

DATE	A3	A4	A5	A6	A7	A8
02/06/79	4.40	2.00	1.60	1.30	1.20	1.90
02/20/79	4.70	1.90	1.80	1.60	.66	1.80
03/05/79	7.98	5.15	8.13	4.43	7.85	3.58
03/27/79	6.80	6.40	9.00	5.70	4.50	1.60
04/10/79	8.20	5.60	7.20	6.80	7.80	3.70
05/02/79	15.40	18.00	24.90	12.60	18.90	41.90
05/02/79	19.50	17.40	26.20	11.30	22.20	46.10
07/10/79	7.60	9.70	2.20	.71	.24	.49
07/24/79	11.30	7.00	4.90	3.00	4.40	3.20
08/07/79	3.80	11.50	4.90	6.20	9.80	6.20
08/21/79	8.50	4.80	6.10	2.20	6.80	4.40
09/24/79	11.30	10.80	16.10	8.00	15.10	15.20
09/24/79	13.30	10.10	15.50	7.80		14.30

TABLE B-59. CHLOROPHYLL A (UG/CM**2) OF THE AUFWUCHS OF CHANNEL B

CSTR

DATE	B3	B4	B5	B6	B7	B8
02/06/79	2.40	4.20	3.00	1.60	1.10	1.60
02/20/79	2.60	3.10	1.20	1.70	.97	1.30
03/05/79	10.30	8.24	2.86	6.22	6.83	2.96
03/27/79	6.70	4.80	6.60	8.70	4.40	5.40
04/10/79	5.40	9.40	12.10	7.20	3.40	8.80
05/02/79	36.90	28.80	45.60	15.00	22.20	35.50
05/02/79	39.50	24.60	41.90	19.30	24.90	37.00
07/10/79	3.60	5.10	1.80	1.20	1.00	.91
07/24/79	4.30	5.40	6.90	3.30	4.30	2.60
08/07/79	17.70	8.70	16.90	6.30	13.20	5.70
08/21/79	7.10	3.80	7.50	3.20	10.70	5.80
09/24/79	22.90	18.70	22.70	14.50	11.70	11.70
09/24/79	22.90	21.80	23.10	14.20	10.30	12.40

TABLE B-60. BACTERIA (CFU/CM**2) OF THE AUFWUCHS OF CHANNEL A

			CSTR					
DATE	A1	A2	A3	A4	A5	A6	A7	A8
02/06/79			5.0E6	4.8E6	2.7E6	1.4E6	3.5E6	5.0E6
02/20/79			2.1E6	2.2E6	8.8E6	9.9E5	1.6E6	8.2E5
03/05/79			1.1E6	2.5E6	5.8E6	5.4E6	2.1E6	1.0E6
03/27/79			5.7E6	3.2E6	5.0E6	1.8E6	3.0E6	5.3E5
04/10/79	7.6E1	6.6E1	5.3E6	4.6E6	2.8E6	4.1E6	6.7E6	1.3E6
05/02/79			1.7E7	3.1E6	1.8E7	9.3E6	7.5E6	2.7E6
07/10/79			1.1E7	5.5E6	5.7E6	5.6E6	6.2E6	2.2E6
07/24/79			2.4E7	9.5E6	7.8E6	9.3E6	5.8E6	6.1E6
08/07/79			8.1E7	3.0E7	3.0E7	2.1E7	9.0E6	9.2E6
08/21/79	8.7E3	6.6E3	4.1E7	2.1E7	1.7E7	1.5E7	2.0E7	1.7E7
09/24/79			1.3E8	6.8E7	8.7E7	4.5E7	5.0E7	2.0E7

TABLE B-61. BACTERIA (CFU/CM**2) OF THE AUFWUCHS OF CHANNEL B

CSTR

DATE	B1	B2	B3	B4	B5	B6	B7	B8
02/06/79			3.5E6	2.8E6	3.6E6	6.4E6	2.2E6	5.7E6
02/20/79			2.3E6	6.7E5	1.2E6	1.6E6	7.8E5	6.3E5
03/05/79			8.9E6	7.6E6	1.6E6	3.2E6	2.1E6	8.9E5
03/27/79			3.3E6	3.3E6	5.2E6	1.4E6	1.0E6	1.8E6
04/10/79	7.6E1	3.4E1	3.0E6	3.6E6	4.4E6	3.4E6	4.1E6	1.8E6
05/02/79			3.8E7	4.1E7	5.4E7	2.0E7	9.3E6	6.6E6
07/10/79			5.0E6	1.2E7	1.1E7	6.8E6	1.0E7	8.8E6
07/24/79			1.1E7	1.4E7	1.1E7	1.2E7	8.7E6	4.6E6
08/07/79			1.7E7	1.8E7	2.6E7	6.7E6	4.8E6	3.2E6
08/21/79	5.4E3	5.4E2	2.0E7	2.5E7	5.8E7	1.5E7	1.4E7	1.9E7
09/24/79			4.4E7	5.0E7	1.3E8	2.1E7	4.2E7	4.2E7

TABLE B-62 SUSPENDED ALGAE IN CHANNEL A AND CHANNEL B ON 02/06/79

CELLS/ML

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chlamydomonas	2.6E2	5.3E2	2.9E2	4.7E2	1.9E2	1.3E2	1.8E2	1.7E2	1.7E2	9.8E1	3.8E1	3.2E1
Ankistrodesmus		3.2E1	2.5E1					1.0E2	8.0E1	1.0E2		1.1E2
Chlorella	4.5E1	2.5E1	1.8E2		3.2E1	8.9E1	2.5E1	1.3E2	4.0E1	1.2E2	3.8E1	2.0E2
Selenastrum	1.5E2		6.4E1		1.2E2		2.0E2		1.3E2		5.1E1	
Scenedesmus	1.9E3	4.6E2	5.8E3	7.4E2	3.1E3	6.4E2	1.8E3	1.4E2	8.9E2	3.4E2	3.2E2	6.4E0
Stigeoclonium	6.9E2	3.6E2	8.5E2		5.9E1	2.8E2			2.5E2	3.4E2	2.9E2	2.5E1
Oedogonium									2.6E2			
Closterium	1.3E1				8.0E0		3.8E1					6.4E0
Cosmarium									4.0E0	4.6E1	3.8E1	5.1E1
Staurastrum	1.6E1								3.1E1	2.1E1	1.3E1	
Mougeotia		2.0E2										
Nitzschia	8.0E1	6.4E1		5.1E1	1.3E1	5.3E1	1.3E1	1.8E2	1.1E2	2.0E2	1.0E2	7.0E1
Navicula						1.3E1			1.1E1		1.3E1	6.4E0
Synedra						3.8E1		2.5E1	4.0E0	2.3E1		

TABLE B-63

SUSPENDED ALGAE IN CHANNEL A AND CHANNEL B ON 02/20/79

CELLS/ML

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Oscillatoria				8.6E1				9.9E2				
Chlamydomonas	1.2E2	2.0E2	5.1E1	5.7E1	7.4E1	2.5E2	2.5E1	2.5E1	1.9E1	3.6E1	6.4E1	
Chlorogonium		6.5E3		1.6E4						7.2E1		
Ankistrodesmus			2.5E1					1.4E2	6.5E0	7.2E1		3.8E1
Chlorella					6.5E0			2.5E1	6.5E0	1.1E2	2.5E1	
Selenastrum	8.0E0		2.5E1		1.5E2	1.5E1	7.3E2	8.9E1	1.9E1		1.1E2	1.3E1
Scenedesmus	4.6E2	2.9E1	1.2E3		2.8E2	2.1E2	4.6E2		6.5E1		3.6E2	6.4E1
Stigeoclonium	1.9E1	8.0E2	6.0E2	1.2E3	2.1E3	1.6E4	7.8E2	1.8E2	1.4E3		1.3E1	
Oedogonium							1.3E1				3.4E2	
Closterium							1.3E1					
Cosmarium				2.9E1	1.8E1	2.9E1	1.3E1				3.8E1	
Staurastrum	1.9E1		3.8E1		1.3E1	3.1E1	5.1E1	6.4E1	2.7E1		5.1E1	
Gonatozygon					2.0E2							
Spirogyra					5.5E1		8.9E1					
Nitzschia	5.3E1		1.3E1		5.0E1	7.5E2	5.1E1	1.3E2	3.8E1		3.8E1	2.5E1
Navicula									1.6E1			3.8E1
Synedra						2.4E2	7.6E1	3.3E2	1.0E2	2.5E2		1.3E2

TABLE 8-64 SUSPENDED ALGAE IN CHANNEL A AND CHANNEL B ON 03/05/79

CELLS/ML

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Microcystis											1.3E2	
Oscillatoria			3.2E3	1.4E3	9.5E1		5.1E2	2.2E3	4.8E3	3.2E3	2.3E2	1.2E3
Anabaena												5.7E1
Merismopedia									1.0E3			
Chlamydomonas	8.0E0	8.0E0	6.5E2		1.3E1				7.2E2	4.9E1	3.8E1	
Ankistrodesmus			2.1E2			7.1E1		7.6E1		2.1E2	1.3E1	2.0E2
Chlorella									1.1E3			
Selenastrum							5.1E1				8.9E1	2.9E1
Scenedesmus			2.9E1			3.5E2			2.1E3	3.8E1	3.1E2	
Tetraedron												5.7E1
Stigeoclonium	3.7E2	3.2E4	6.5E3	6.7E3	4.4E3	2.3E3	1.5E3	5.8E3	5.2E3	2.5E3	4.8E2	1.5E3
Oedogonium					1.5E2	1.6E2		4.7E2	1.3E4	4.5E1	3.7E3	2.9E1
Cosmarium			1.7E2						1.0E2	6.5E0	3.8E1	
Staurastrum	1.6E1				1.9E1	6.5E0			1.0E2		2.5E1	
Gonatozygon					2.5E2		3.3E2		4.1E2		2.5E2	
Spirogyra					1.6E1						1.3E1	2.9E1
Nitzschia	3.2E1	2.4E1	3.2E2		3.5E1	1.1E2				1.9E1	2.2E2	2.9E1
Navicula									5.1E2	6.5E0		
Synedra			4.6E2		4.6E1	2.6E1	1.3E1	2.2E2	2.1E2	1.9E2	4.1E2	3.7E2
Gomphonema											1.0E2	
Fragilaria									3.1E2			
Achnanthes											1.3E1	5.7E1

TABLE B-65

SUSPENDED ALGAE IN CHANNEL A AND CHANNEL B ON 03/27/79

CELLS/ML

ALGAE	CSTR 3 A	CSTR 3 B	CSTR 4 A	CSTR 4 B	CSTR 5 A	CSTR 5 B	CSTR 6 A	CSTR 6 B	CSTR 7 A	CSTR 7 B	CSTR 8 A	CSTR 8 B
Chroococcus											1.1E3	
Microcystis				3.9E1							4.6E3	
Oscillatoria	3.2E2	1.3E3	4.1E2		4.8E2		3.0E3	7.7E2	1.0E2		6.2E2	5.4E2
Lyngbya											2.7E2	
Merismopedia									5.4E2			
Chlamydomonas	1.0E2	1.6E2	9.6E1		9.4E1	2.1E1	4.8E1	9.1E1	5.7E1		1.1E2	2.1E1
Ankistrodesmus							1.3E2	1.8E2	6.5E0		3.9E2	1.4E1
Chlorella				2.1E1				1.4E2				
Selenastrum			6.4E0		6.2E1				4.9E1			2.1E1
Scenedesmus	3.9E3	1.5E3	2.2E3	9.3E2	1.2E3	1.4E2	1.7E3	1.1E3	1.1E3		2.3E3	5.7E2
Tetraedron												1.4E1
Stigeoclonium	4.3E2		4.6E2	7.0E0	4.5E2				1.4E2			2.8E2
Oedogonium	2.5E1						5.6E2	4.1E2	1.0E3		4.9E3	1.4E2
Cosmarium								4.6E1	1.0E1		7.2E1	1.4E1
Penium			6.4E0									1.4E1
Staurastrum	1.3E1		6.4E0				1.6E1		3.2E0		5.7E1	
Gonatozygon					7.7E1		1.1E2		2.9E1		7.2E1	
Spirogyra	1.9E1		6.4E0		3.5E0	1.4E1		1.8E2	5.2E1		2.9E1	
Chlorococcum									1.8E1			
Nitzschia	1.9E1		1.9E1	2.2E1	4.1E1	2.8E1	9.6E1		7.0E1			2.1E1
Navicula	6.4E0		6.4E0	4.1E1				9.1E1	7.0E0			
Synedra							6.4E1				4.3E1	1.4E1
Gomphonema					6.5E0		3.2E1		6.5E0		5.7E1	
Cymbella												7.1E0
Achnanthes									1.9E1			2.1E2

TABLE B-66 SUSPENDED ALGAE IN CHANNEL A AND CHANNEL B ON 04/10/79

CELLS/ML

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Microcystis		2.5E2						1.7E2	4.3E1		6.8E2	
Oscillatoria	8.0E2		5.7E2		3.6E3		3.4E3		4.5E1		8.4E2	
Merismopedia								7.6E1				
Phormidium									2.6E1		3.3E2	
Chlamydomonas	2.6E3	1.5E2	4.4E2	3.2E1	5.2E2	1.5E2	2.7E2		2.9E1			
Chlorogonium	4.3E1											
Pandorina												5.1E1
Ankistrodesmus	2.9E1				3.4E2			3.2E1	4.5E1		1.3E1	1.0E2
Chlorella		7.6E1			6.4E0	3.2E1		5.7E2	4.5E1		5.1E1	2.5E2
Selenastrum				6.4E0			3.6E2		4.6E1			
Scenedesmus	8.1E3	7.9E2	2.9E3	8.8E2	2.2E3	1.6E3	1.0E4	1.8E2	5.6E2		3.7E2	5.1E1
Tetraedron									6.5E0			6.4E0
Stigeoclonium	1.4E2		5.6E2						2.6E1			
Oedogonium	6.5E1								5.5E1			
Cosmarium			2.9E1						6.5E0		1.3E1	
Penium		1.3E1		1.3E1		1.5E1						
Staurastrum	7.7E1	1.3E1		6.4E0		1.6E1			1.1E1		3.8E1	
Gonatozygon	2.9E1	1.3E1	1.0E2	6.4E0	1.3E1	2.9E1			1.4E1		1.3E1	
Spirogyra	2.9E1				8.9E1	1.1E2	4.4E2	1.2E2	1.5E2		8.2E2	7.6E1
Mougeotia		2.8E2		2.5E1		2.1E2		6.4E0				
Nitzschia	3.6E2	1.0E2	4.3E1	8.3E1	1.9E2	4.4E1	2.7E2	1.3E1	4.1E1		2.5E1	6.4E0
Navicula	2.5E2				6.4E0	4.8E1						1.3E1
Synedra	4.5E2		4.3E1			7.1E1	1.8E2		7.0E0			
Gomphonema	1.5E1		2.9E1	2.5E1			9.1E1		7.0E0			6.4E0
Achnanthes					6.4E0		1.8E2		7.0E0			1.3E1
Tribonema	3.6E3		4.4E2									

TABLE B-67 Summary of Suspended Algae in Channel Microcosms
Experiment 1 (CELLS/ML)

DATE	CSTR	CYANOPHYTA	CHLOROPHYTA	CHRYSOPHYTA	TOTAL
02/06/79	A3		3.1E 3	8.0E 1	3.2E 3
02/06/79	A4		7.2E 3		7.2E 3
02/06/79	A5		3.5E 3	1.3E 1	3.5E 3
02/06/79	A6		2.2E 3	1.3E 1	2.3E 3
02/06/79	A7		1.9E 3	1.2E 2	2.0E 3
02/06/79	A8		7.9E 2	1.1E 2	9.0E 2
02/06/79	B3		1.6E 3	6.4E 1	1.7E 3
02/06/79	B4		1.2E 3	5.1E 1	1.3E 3
02/06/79	B5		1.1E 3	1.0E 2	1.2E 3
02/06/79	B6		5.4E 2	2.0E 2	7.5E 2
02/06/79	B7		1.1E 3	2.2E 2	1.3E 3
02/06/79	B8		4.3E 2	7.6E 1	5.1E 2
02/20/79	A3		6.3E 2	5.3E 1	6.8E 2
02/20/79	A4		1.9E 3	1.3E 1	2.0E 3
02/20/79	A5		2.9E 3	5.0E 1	2.9E 3
02/20/79	A6		2.2E 3	1.3E 2	2.3E 3
02/20/79	A7		1.5E 3	1.5E 2	1.7E 3
02/20/79	A8		1.0E 3	3.8E 1	1.0E 3
02/20/79	B3		7.5E 3		7.5E 3
02/20/79	B4	8.6E 1	1.7E 4		1.7E 4
02/20/79	B5		1.7E 4	9.9E 2	1.8E 4
02/20/79	B6	9.9E 2	5.2E 2	4.6E 2	2.0E 3
02/20/79	B7		2.9E 2	2.5E 2	5.4E 2
02/20/79	B8		1.1E 2	1.9E 2	3.1E 2
03/05/79	A3		3.9E 2	3.2E 1	4.3E 2
03/05/79	A4	3.2E 3	7.6E 3	7.8E 2	1.2E 4
03/05/79	A5	9.5E 1	4.8E 3	8.1E 1	5.0E 3
03/05/79	A6	5.1E 2	1.9E 3	1.3E 1	2.4E 3
03/05/79	A7	5.8E 3	2.3E 4	1.0E 3	3.0E 4
03/05/79	A8	3.6E 2	5.0E 3	7.4E 2	6.1E 3
03/05/79	B3		3.2E 4	2.4E 1	3.2E 4
03/05/79	B4	1.4E 3	6.7E 3		8.1E 3
03/05/79	B5		2.9E 3	1.4E 2	3.0E 3
03/05/79	B6	2.2E 3	6.3E 3	2.2E 2	8.8E 3
03/05/79	B7	3.2E 3	2.8E 3	2.2E 2	6.3E 3
03/05/79	B8	1.3E 3	1.8E 3	4.6E 2	3.6E 3

(Continued)

TABLE B-67 (Continued)

DATE	CSTR	CYANOPHYTA	CHLOROPHYTA	CHRYSOPHYTA	TOTAL
03/27/79	A3	3.2E 2	4.5E 3	2.5E 1	4.8E 3
03/27/79	A4	4.1E 2	2.8E 3	2.5E 1	3.2E 3
03/27/79	A5	4.8E 2	1.9E 3	4.8E 1	2.4E 3
03/27/79	A6	3.0E 3	2.6E 3	1.9E 2	5.8E 3
03/27/79	A7	6.4E 2	2.5E 3	1.0E 2	3.2E 3
03/27/79	A8	6.6E 3	7.9E 3	1.0E 2	1.5E 4
03/27/79	B3	1.3E 3	1.7E 3		3.0E 3
03/27/79	B4	3.9E 1	9.6E 2	6.3E 1	1.1E 3
03/27/79	B5		1.7E 2	2.8E 1	2.0E 2
03/27/79	B6	7.7E 2	2.1E 3	9.1E 1	3.0E 3
03/27/79	B8	5.4E 2	1.1E 3	2.5E 2	1.9E 3
04/10/79	A3	8.0E 2	1.1E 4	4.7E 3	1.7E 4
04/10/79	A4	5.7E 2	4.0E 3	5.6E 2	5.2E 3
04/10/79	A5	3.6E 3	3.2E 3	2.0E 2	7.0E 3
04/10/79	A6	3.4E 3	1.1E 4	7.2E 2	1.5E 4
04/10/79	A7	1.1E 2	9.9E 2	6.2E 1	1.2E 3
04/10/79	A8	1.8E 3	1.3E 3	2.5E 1	3.2E 3
04/10/79	B3	2.5E 2	1.3E 3	1.0E 2	1.7E 3
04/10/79	B4		9.7E 2	1.1E 2	1.1E 3
04/10/79	B5		2.2E 3	1.6E 2	2.3E 3
04/10/79	B6	2.5E 2	9.1E 2	1.3E 1	1.2E 3
04/10/79	B8		5.3E 2	3.9E 1	5.7E 2

TABLE B-68

AUFWUCHS ALGAE IN CHANNEL A AND CHANNEL B ON 02/06/79

CELLS/CM**2

	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
ALGAE	A	B	A	B	A	B	A	B	A	B	A	B
Oscillatoria			6.5E4			2.4E4						
Chlamydomonas	2.4E5	2.7E5	5.5E4	2.1E5		6.0E4	1.8E5	2.7E5	4.6E4	5.7E4	7.5E4	9.9E4
Ankistrodesmus					9.0E2			7.3E4		5.9E4		4.0E4
Chlorella			7.2E3	1.7E4					1.3E3			
Selenastrum		1.7E4	2.4E3		6.0E4				1.8E4	3.3E3	9.0E4	6.9E4
Scenedesmus	1.1E7	8.8E6	3.0E6	7.8E6	1.4E6	2.3E6	5.8E6	1.3E7	2.8E6	2.8E6	3.7E6	6.4E6
Stigeoclonium	6.8E5	5.4E5	3.4E5	9.3E5	3.3E5	8.4E4	6.9E5	8.2E5	5.8E5	4.1E5	2.4E5	6.5E5
Cosmarium					2.1E3				1.8E4	4.0E4	1.5E4	3.0E4
Staurastrum	1.7E4					4.0E3			7.5E3	2.5E4	1.5E4	9.9E3
Mougeotia					1.6E4							
Nitzschia	1.7E4	6.4E4		6.9E4	4.8E3	4.0E4	7.1E4	1.3E5	4.1E4	9.8E4	3.0E4	4.0E4
Navicula		1.2E4						1.8E4	1.8E4	9.0E3		9.9E3
Synedra		1.2E4				8.0E3		1.8E4				

TABLE B-69

AUFWUCHS ALGAE IN CHANNEL A AND CHANNEL B ON 02/20/79

CELLS/CM**2

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Oscillatoria	4.8E6	2.6E4	1.9E6	7.2E5		2.9E5				8.0E4		
Chlamydomonas	7.5E4	1.9E5	1.7E4	1.2E5		2.1E4		5.5E4	1.8E4	4.0E4	1.0E4	1.1E4
Ankistrodesmus								7.3E4				1.1E4
Chlorella				2.3E4								
Selenastrum			1.7E4		1.1E4		7.0E3		1.8E4			
Scenedesmus	2.4E7	9.0E6	2.2E7	5.1E6	8.8E6	5.9E6	3.5E6	2.2E6	3.4E6	5.1E6	5.5E6	6.6E6
Stigeoclonium	2.3E5	1.1E5	2.0E5	7.5E5	1.2E6	7.7E5	2.4E6	3.1E6	2.2E6	5.1E6	1.4E6	1.8E6
Cosmarium		4.3E3					3.5E4	1.8E4	1.8E4		1.0E4	2.1E4
Staurastrum	6.3E4	1.3E4	5.0E4	9.2E3	6.8E4					8.0E4	1.0E4	6.4E4
Gonatozygon					2.3E4		2.0E4					
Nitzschia	5.0E4	4.7E4	3.4E4	1.2E5	6.8E4	1.8E5	7.0E3	5.5E4	5.4E4	6.0E4	1.3E5	5.3E4
Navicula										4.0E4		2.1E4
Synedra						1.0E4		1.8E5		1.4E5	1.0E4	4.2E4
Gomphonema					2.3E4			3.7E4				1.1E4

TABLE B-70

AUFWUCHS ALGAE IN CHANNEL A AND CHANNEL B ON 03/05/79

CELLS/CM**2

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus	4.8E4											
Microcystis									4.8E4			
Synechococcus								6.5E3				
Oscillatoria	1.9E6	1.1E5	8.6E5	1.3E6	1.5E5	3.9E5	1.6E5	1.3E6	8.5E3	2.0E6	2.2E5	
Chlamydomonas	1.9E5	2.0E5	4.3E4	1.4E5	2.0E3	1.7E4	8.6E3	6.5E3	5.5E4	1.0E4	1.3E4	
Chlorogonium				1.7E4								
Pandorina						7.2E5		4.2E5				
Ankistrodesmus						4.5E3		6.5E3				
Chlorella			1.4E4	4.1E5	2.0E3							
Selenastrum					4.0E3							
Scenedesmus	7.4E6	3.6E6	3.2E6	2.2E6	5.4E6	3.0E6	2.5E6	3.1E5	1.6E6	3.1E6	1.6E6	5.1E6
Stigeoclonium	1.8E5	4.6E5	7.9E4	9.6E4	1.7E6	9.9E5	4.9E4	2.7E5	9.9E4	1.4E5	6.6E4	7.1E4
Oedogonium				2.2E5		4.1E4	2.9E4	1.2E5	1.4E6	2.1E6	1.4E6	1.0E6
Cosmarium					4.0E3	3.2E3	8.6E3	6.5E3	3.9E4	1.1E5		2.0E4
Penium					8.0E3							
Staurastrum	7.3E4	1.2E4	2.2E4	4.3E4	2.5E4	9.0E3	2.6E4	1.3E4	1.1E4	5.9E4	2.6E4	3.0E4
Gonatozygon				1.7E4	1.7E4		1.4E4		3.5E3			
Nitzschia	3.8E5	7.0E4	3.6E4	7.0E4	6.7E4	1.3E5	8.6E3	3.9E4	2.0E4	5.0E3	5.2E4	
Navicula		2.3E4			4.0E3		1.4E4	1.3E4	1.4E4	1.0E4		4.1E4
Synedra		1.2E4		3.5E4	1.8E4	1.4E4	3.4E4	2.0E5	1.8E4	1.0E5	5.2E4	1.8E5
Gomphonema		2.3E4			1.1E4		1.1E4	2.0E4	1.8E3	3.0E4	1.3E4	
Achnanthes								1.3E4		8.9E4		8.1E4
Trachelomonas								3.9E4				

TABLE B-71

AUFWUCHS ALGAE IN CHANNEL A AND CHANNEL B ON 03/27/79

CELLS/CM**2

ALGAE	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus									5.5E3			
Microcystis	1.4E6	1.8E5		8.8E5		1.6E5	3.6E6	6.4E5	4.3E5	2.2E6		4.6E7
Oscillatoria	1.0E7	4.4E6	7.4E6	5.8E6	6.1E6	3.3E6	5.8E6	1.6E6	6.0E4	5.0E5		3.0E6
Lyngbya	2.9E4	6.0E5					1.5E6	4.2E5		2.8E5		
Merismopedia	1.6E4								7.5E4	7.5E4		
Chlamydomonas	6.5E4	1.5E5	1.7E4	6.6E4	2.8E4	6.9E4		2.6E4	9.0E4	1.2E5	1.9E4	1.1E5
Pandorina						1.4E5				3.0E5		
Ankistrodesmus						1.8E4		2.0E4				4.3E4
Chlorella						3.5E4		1.3E4	8.5E3			
Selenastrum					1.9E4						9.7E3	
Scenedesmus	1.3E7	1.3E7	7.0E6	5.4E6	3.9E6	3.6E6	1.4E6	2.1E6	2.5E5	2.8E6	2.8E5	3.7E6
Tetraedron									2.9E3	1.3E4		1.1E5
Stigeoclonium	9.0E4	2.7E5	2.0E5	2.7E4	4.3E5	6.5E5		5.9E4	4.3E4	1.3E5		3.2E5
Oedogonium			8.4E4			4.2E5	3.3E5	2.0E5	3.2E6	2.6E6	1.0E6	1.3E6
Cosmarium					3.1E4	2.6E4	4.5E4	7.2E4	2.4E4	9.5E4		1.1E5
Staurastrum	6.0E3	1.1E4	8.4E4		4.0E4	8.5E3		6.6E3	2.7E4	3.3E3	2.9E4	4.3E4
Gonatozygon					9.5E4		3.2E4		5.5E3	3.3E3		
Spirogyra		5.0E3	3.4E4			1.8E4	1.3E4		1.5E4			
Characium	1.9E3					2.6E4						
Chlorococcum						4.9E4						
Nitzschia	3.3E4	4.2E4	1.2E5	6.6E4	4.5E5	1.5E5			3.6E4		1.9E4	
Navicula		2.6E4			9.0E3	1.1E5		2.0E4	1.3E5	1.1E5	3.9E4	
Synedra		5.0E3			6.5E3	3.1E4	3.8E4	6.6E3	4.0E4	5.5E4	3.9E4	6.4E4
Gomphonema	1.9E3			1.3E4	2.2E4		3.2E4	6.6E3	4.3E4	1.7E4	9.7E3	
Cymbella	1.9E3						6.4E3					
Fragilaria								2.6E4				
Achnanthes	1.9E3						2.6E4	3.3E4	2.9E3	5.4E5	1.9E4	9.2E5

TABLE B-72

AUFWUCHS ALGAE IN CHANNEL A AND CHANNEL B ON 04/10/79

CELLS/CM**2

ALGAE	CSTR 3 A	CSTR 3 B	CSTR 4 A	CSTR 4 B	CSTR 5 A	CSTR 5 B	CSTR 6 A	CSTR 6 B	CSTR 7 A	CSTR 7 B	CSTR 8 A	CSTR 8 B
Chroococcus					3.6E4				1.9E5		3.5E5	
Microcystis	6.0E5	8.0E5	6.8E5	6.6E6	2.0E6	3.8E6	4.1E6	2.8E6	6.7E6	1.9E6	1.4E7	2.4E7
Synechococcus									1.9E5			
Oscillatoria	1.5E6	1.5E6	8.9E6	5.8E5	6.8E6	9.2E5	8.7E6	4.0E5	2.3E6	4.6E5		
Lyngbya	4.6E5	1.7E5			2.2E5	3.0E5					8.9E4	4.4E5
Chlamydomonas	8.2E4	1.1E5		4.7E4	9.5E3	1.7E4			2.5E4		3.2E4	
Ankistrodesmus					2.9E4				6.5E3			
Chlorella			7.0E4			1.2E5		1.5E5	1.3E4			
Selenastrum				2.3E4	3.7E4							
Scenedesmus	2.4E6	9.5E6	6.7E6	8.9E6	3.8E6	1.1E6	5.8E6	1.8E6	9.2E5	2.1E6	9.4E5	2.6E6
Stigeoclonium	1.2E6	3.5E5		5.1E5		2.2E5		4.4E5	3.5E5	4.9E6		
Oedogonium				9.3E4			1.4E5		3.6E6	1.3E6	1.2E6	1.8E6
Cosmarium	1.3E4				9.5E3	6.5E3			3.7E4		4.8E4	4.2E4
Penium		7.0E3				3.3E3						
Staurastrum	3.0E4	1.9E4		4.7E4	3.8E4	1.0E4	7.1E4		3.7E4		8.1E4	4.2E4
Gonatozygon	3.2E3	1.7E4			2.0E4	3.3E3	3.6E4				3.2E4	
Spirogyra	6.5E3		2.3E4		1.7E4	5.0E3		3.7E4	6.5E3			
Chlorococcum		5.0E4				2.9E5			9.2E5		3.6E5	
Mougeotia		1.6E4				5.0E3			1.9E4			
Nitzschia	2.1E4	8.3E4	7.0E4	1.2E5	1.8E5	3.2E4	7.1E4		5.6E4			4.2E4
Navicula	2.2E4	1.3E4			8.5E4	8.0E4			3.7E4		1.6E4	
Synedra		1.8E3			2.0E4	3.8E4	3.6E4		3.1E4	3.8E4	5.6E4	1.0E5
Gomphonema		3.6E3		2.3E4	3.5E4	6.5E3	1.4E5		5.0E4		5.6E4	
Cymbella							3.6E4		1.8E4		1.6E4	4.2E4
Fragilaria		7.0E4										
Achnanthes	4.8E3	1.3E4							3.1E4	2.3E5	1.1E5	7.9E5
Tribonema	1.1E4	5.5E5										

TABLE B-73 Summary of Aufwuchs Algae in Channel Microcosms
Experiment 1 (CELLS/CM**2)

DATE	CSTR	CYANOPHYTA	CHLOROPHYTA	CHRYSOPHYTA	TOTAL
02/06/79	A3		1.2E 7	1.7E 4	1.2E 7
02/06/79	A4	6.5E 4	3.4E 6		3.5E 6
02/06/79	A5		1.8E 6	4.8E 3	1.8E 6
02/06/79	A6		6.7E 6	7.1E 4	6.7E 6
02/06/79	A7		3.5E 6	5.9E 4	3.5E 6
02/06/79	A8		4.1E 6	3.0E 4	4.2E 6
02/06/79	B3		9.6E 6	8.8E 4	9.7E 6
02/06/79	B4		9.0E 6	6.9E 4	9.0E 6
02/06/79	B5	2.4E 4	2.4E 6	4.8E 4	2.5E 6
02/06/79	B6		1.4E 7	1.7E 5	1.4E 7
02/06/79	B7		3.4E 6	1.1E 5	3.5E 6
02/06/79	B8		7.3E 6	5.0E 4	7.3E 6
02/20/79	A3	4.8E 6	2.4E 7	5.0E 4	2.9E 7
02/20/79	A4	1.9E 6	2.2E 7	3.4E 4	2.4E 7
02/20/79	A5		1.0E 7	9.1E 4	1.0E 7
02/20/79	A6		6.0E 6	7.0E 3	6.0E 6
02/20/79	A7		5.7E 6	5.4E 4	5.7E 6
02/20/79	A8		6.9E 6	1.4E 5	7.1E 6
02/20/79	B3	2.6E 4	9.3E 6	4.7E 4	9.4E 6
02/20/79	B4	7.2E 5	6.0E 6	1.2E 5	6.8E 6
02/20/79	B5	2.9E 5	6.7E 6	1.9E 5	7.2E 6
02/20/79	B6		5.4E 6	2.7E 5	5.7E 6
02/20/79	B7	8.0E 4	1.0E 7	2.4E 5	1.1E 7
02/20/79	B8		8.5E 6	1.3E 5	8.6E 6
03/05/79	A3	1.9E 6	7.8E 6	3.8E 5	1.0E 7
03/05/79	A4	8.6E 5	3.4E 6	3.6E 4	4.3E 6
03/05/79	A5	1.5E 5	7.2E 6	1.0E 5	7.4E 6
03/05/79	A6	1.6E 5	2.6E 6	6.8E 4	2.9E 6
03/05/79	A7	5.7E 4	3.2E 6	5.4E 4	3.3E 6
03/05/79	A8	2.2E 5	3.1E 6	1.2E 5	3.4E 6
03/05/79	B3	1.1E 5	4.3E 6	1.3E 5	4.5E 6
03/05/79	B4	1.3E 6	3.1E 6	1.0E 5	4.5E 6
03/05/79	B5	3.9E 5	4.8E 6	1.4E 5	5.3E 6
03/05/79	B6	1.3E 6	1.2E 6	2.8E 5	2.7E 6
03/05/79	B7	2.0E 6	5.5E 6	2.3E 5	7.8E 6
03/05/79	B8		6.2E 6	3.0E 5	6.5E 6

(Continued)

TABLE B-73 (Continued)

DATE	CSTR	CYANOPHYTA	CHLOROPHYTA	CHRYSOPHYTA	TOTAL
03/27/79	A3	1.1E 7	1.3E 7	3.9E 4	2.5E 7
03/27/79	A4	7.4E 6	7.4E 6	1.2E 5	1.5E 7
03/27/79	A5	6.1E 6	4.5E 6	4.9E 5	1.1E 7
03/27/79	A6	1.1E 7	1.8E 6	1.0E 5	1.3E 7
03/27/79	A7	5.7E 5	3.7E 6	2.5E 5	4.5E 6
03/27/79	A8		1.3E 6	1.3E 5	1.5E 6
03/27/79	B3	5.2E 6	1.3E 7	7.3E 4	1.9E 7
03/27/79	B4	6.7E 6	5.5E 6	7.9E 4	1.2E 7
03/27/79	B5	3.5E 6	5.1E 6	2.9E 5	8.8E 6
03/27/79	B6	2.7E 6	2.5E 6	9.2E 4	5.2E 6
03/27/79	B7	3.1E 6	6.1E 6	7.2E 5	9.8E 6
03/27/79	B8	4.9E 7	5.7E 6	9.8E 5	5.6E 7
04/10/79	A3	2.6E 6	3.7E 6	5.9E 4	6.4E 6
04/10/79	A4	9.6E 6	6.8E 6	7.0E 4	1.6E 7
04/10/79	A5	9.1E 6	4.0E 6	3.2E 5	1.3E 7
04/10/79	A6	1.3E 7	6.0E 6	2.8E 5	1.9E 7
04/10/79	A7	9.4E 6	5.9E 6	2.2E 5	1.6E 7
04/10/79	A8	1.4E 7	2.7E 6	2.5E 5	1.7E 7
04/10/79	B3	2.5E 6	1.0E 7	7.3E 5	1.3E 7
04/10/79	B4	7.2E 6	9.6E 6	1.4E 5	1.7E 7
04/10/79	B5	5.0E 6	1.8E 6	1.6E 5	7.0E 6
04/10/79	B6	3.2E 6	2.4E 6		5.6E 6
04/10/79	B7	2.4E 6	8.3E 6	2.7E 5	1.1E 7
04/10/79	B8	2.4E 7	4.5E 6	9.7E 5	3.0E 7

Table B-74. Relative Frequency of Occurrence[1] of Suspended Algae in Channel A and B on July 24, 1979.

Algae	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus				5							40	
Oscillatoria	10	40	30		10	25	50	30	45	100	100	40
Lyngbya												
Phormidium			5	40								
Spirulina										20		
Chlamydomonas	75	100	90	85	80	60	40	65	60	80	30	55
Ankistrodesmus				20	10	20		25	40	100	15	35
Scenedesmus	5	10	30				25		50	30	75	
Pediastrum												
Stigeoclonium	5	35	5	20	45	35	25	40	15	30	15	10
Cosmarium									15	5		10
Penium												
Staurastrum		5	10			5		10		20	5	
Spirogyra												
Chlorococcum												
Unidentifed Chlorophyte		20				20		90	30			
Nitzschia	20	25		60	5	50	10	10		80	55	
Navicula	5	10			5	20					5	
Synedra	35	65	55	85	60	75	65	65	35	5		35
Gomphonema											5	
Achnanthes												
Chroomonas												
Unidentified Cryptophyte			30			30					20	

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[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-75. Relative Frequency of Occurrence[1] of Suspended Algae in Channel A and Channel B on August 7, 1979.

Algae	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus							15	20				
Oscillatoria	45	10	55	30	55	65	55	25	35	65	45	100
Lyngbya												
Phormidium												
Spirulina	100		50									
Chlamydomonas	90	95	75	80	75	40	50	75	80	55	60	75
Ankistrodesmus								25		50		55
Scenedesmus	15			5		10	15		20	35	30	70
Pediastrum						5						
Stigeoclonium	15		25					5	50	5	50	5
Cosmarium												
Penium				5								
Staurastrum			5			10				5		
Spirogyra												
Chlorococcum												
Unidentified Chlorophyte												
Nitzschia	30		20			100		50	45	100		100
Navicula								25				10
Synedra	90	100	80	95	75		60	85	55		50	10
Gomphonema												
Achnanthes	10											
Chroomonas											45	
Unidentified Cryptophyte												

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[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-76. Relative Frequency of Occurrence[1] of Suspended Algae in Channel A and Channel B on August 21, 1979.

Algae	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus		5										
Oscillatoria	25	35	40	15	10	15	40	15	35	30	50	95
Lyngbya										5	5	15
Phormidium	15		10									
Spirulina					5		15			5		
Chlamydomonas	100	55	95	45	70	10	50	45	65	10	20	80
Ankistrodesmus						5		20	5	35	5	30
Scenedesmus		35		65	15	25	25	40	10	80	25	75
Pediastrum												
Stigeoclonium	5		5			5						
Cosmarium												
Penium												
Staurastrum		5				5	5	5				5
Spirogyra		5	5		5							
Chlorococcum										15		
Unidentified Chlorophyte												
Nitzschia					5	5			15			
Navicula										20		5
Synedra	85	5	50	35	35	30	25	45	30	25	15	15
Gomphonema												
Achnanthes												
Chroomonas												
Unidentified Cryptophyte												

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[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-77. Relative Frequency of Occurrence[1] of Suspended Algae Experiment 2.

Algae	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Chroococcus	1	1		6		
Oscillatoria	28	28	29	35	52	63
Lyngbya					1	3
Phormidium	3	9				
Spirulina	17	8	1	3	4	
Chlamydomonas	86	74	57	54	58	53
Ankistrodesmus		3	6	12	38	23
Scenedesmus	11	17	8	16	38	46
Stigeoclonium	10	9	15	12	17	13
Cosmarium					3	2
Penium		1				
Staurastrum	2	3	3	3	4	2
Spirogyra	1	1	1			
Unidentified Chlorophyte	3		3	15	5	
Chlorococcum					3	
Nitzschia	13	13	28	12	40	26
Navicula	3		4	4	3	3
Synedra	63	67	46	58	25	21
Gomphonema						1
Achnanthes	2					
Chroomonas			7			8
Unidentified Cryptophyte		5	5			3

[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-78. Relative Frequency of Occurrence[1] of Aufwuchs Algae in Cnannel A and Channel B on July 24, 1979.

Algae	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus		20		15						55		40
Microcystis										20		35
Oscillatoria	80		85		80	65	80	50	85	100	75	100
Lyngbya												
Phormidium					35		35					
Chlamydomonas	90	100	50	95	75	75	80	75	45	70	50	80
Ankistrodesmus					25					80		70
Scenedesmus		20		35	25	35		80	40	80	35	90
Pediastrum									5			
Stigeoclonium	35	90	60	85	65	80	80	90	25	100	40	100
Cosmarium	20		10		5			5	5	50	15	40
Staurastrum				10		30	30	5		10		15
Spirogyra												
Chlorococcum												
Unidentified Chlorophyte												
Nitzschia				35	30	20	55			75		35
Navicula									15			
Synedra	45	80	35	70	55	60	65	60	25		50	10
Gomphonema		15			40		30	15		35		85
Cymbella												
Achnanthes										25		55
Unidentified Cryptophyte											40	

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[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-79. Relative Frequency of Occurrence[1] of Aufwuchs Algae in Channel A and Channel B on August 7, 1979.

Algae	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus		20	20	5		15	80					
Microcystis							40	10				
Oscillatoria	100	100	100	100	75	100	100	95	70	90	70	80
Lyngbya		65		15	55	55	45	5	75	15	45	
Chlamydomonas	100	100	80	45	60	60	10	45	20	55		
Ankistrodesmus										35		
Scenedesmus	70	45	25	40	50	50	30	20	60	50	65	55
Pediastrum												
Stigeoclonium	75	85	70	5	70	50	15	50		55	30	30
Cosmarium	20							10	20	10	10	15
Staurastrum	55	10	30			10	50	10				
Spirogyra												
Chlorococcum												
Unidentified Chlorophyte												
Nitzschia	100		95				55					
Navieula					40	5	15	35	15		20	
Synedra		95		50		55		65	55	55	35	45
Gomphonema	5				55		55	55	50		40	45
Cymbella						5						
Achnanthes												
Unidentified Cryptophyte		40		75	55	60		75	60	50	50	65

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[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-80. Relative Frequency of Occurrence[1] of Aufwuchs Algae in Channel A and Channel B on August 21, 1979.

Algae	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Chroococcus	35	90		40	20	55	20	20	5	55	20	30
Microcystis			10				10	10				25
Oscillatoria	100	100	100	100	100	100	90	100	95	100	100	100
Lyngbya	75		65		100		90		100		75	
Phormidium	95	80	85	40	95	75	75	40	75	15	85	
Chlamydomonas	100	100	90	80	60	75	55		20	5	45	20
Ankistrodesmus						60		20		75		10
Scenedesmus		30		80		50	10	70	95	90	65	90
Pediastrum	75	50	20		15	35		15	5	15	10	25
Stigeoclonium	75	50	20		15	35		15	5	15	10	25
Cosmarium						15			5	55	10	25
Staurastrum	10	25		20	5	55			10		5	
Spirogyra	5		15									
Chlorococcum			5									
Unidentified Chlorophyte			10									
Nitzschia		75		85		80		75		80		75
Navicula								20	30	30	10	15
Synedra	90		75	15	15	20	50		10	25	25	10
Gomphonema	15		5			25	40	25	35		5	55
Cymbella												
Achnanthes												20
Unidentified Cryptophyte	45		70		55		80		75		85	

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[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-81. Relative Frequency of Occurrence[1] of Aufwuchs Algae Experiment 2.

Algae	CSTR 3	CSTR 4	CSTR 5	CSTR 6	CSTR 7	CSTR 8
Chroococcus	28	13	15	20	19	15
Microcystis		2		12	3	10
Oscillatoria	80	81	78	86	90	88
Lyngbya	13	11	17	15	17	13
Phormidium	43	23	53	33	30	28
Chlamydomonas	98	73	68	44	36	33
Ankistrodesmus			14	3	32	13
Scenedesmus	28	30	35	35	69	67
Pediastrum					1	
Stigeoclonium	68	40	53	42	33	39
Cosmarium	7	2	3	3	24	19
Staurastrum	17	10	17	16	3	3
Spirogyra	1	3				
Chlorococcum		1				
Unidentified Chlorophyte		2				
Nitzschia	2	35	22	31	26	18
Navicula			8	12	15	8
Synedra	52	41	34	40	28	29
Gomphonema	6	1	20	36	20	38
Cymbella			1			
Achnanthes					4	13
Unidentified Cryptophyte	14	24	28	26	31	40

[1] Expressed as the percentage of fields of view in which a particular genus occurred (McIntire, 1968), based upon 120 fields from 6 samples.

Table B-82. Species of Suspended Algae Identified on August 21, 1979.

Taxa		CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
		A	B	A	B	A	B	A	B	A	B	A	B
Oscillatoria	subbrevis	x	x	x	x	x	x	x	x	x	x	x	x
	anguina	x	x	x		x		x		x	x		
	limnetica		x			x	x	x		x	x	x	x
	geminata	x	x	x		x	x	x		x	x	x	x
	formosa							x					
Phormidium	interruptum		x										
	subfuscum					x			x				
Lyngbya	subtilis			x		x			x				
Spirulina	laxa	x		x				x		x		x	
	princeps												x
Chroococcus	minimus		x					x					
Aphanothece	saxicola				x								
Microcystis	incerta	x				x					x		x
Scenedesmus	denticulatus	x	x	x			x		x	x	x	x	x
	dimorphus		x	x	x		x	x	x	x	x	x	x
	obliquus				x						x		
	bijuga				x	x	x		x		x	x	x
	bernardii								x		x		x
	abundans											x	x
	quadricauda	x		x						x			
Coelastrum	microporum	x	x		x	x		x		x	x		x
Chlamydomonas	globosa	x	x	x	x	x	x	x	x	x	x	x	x
	pseudopertyii	x	x			x		x	x	x		x	x
Staurastrum	breviaculeatum	x	x	x				x					
Ankistrodesmus	falcatus			x			x			x		x	x
Spirogyra	sp.	x	x	x	x		x		x				
Stigeoclonium	sp.	x	x	x	x		x					x	x
Trachelomonas	pulchella								x				
Chroomonas	nordstedtii					x							
Nitzschia	palea	x		x		x		x		x		x	
Gomphonema	parvulum	x											

Table B-83. Species of Aufwuchs Algae Identified on August 21, 1979.

Taxa	CSTR 3		CSTR 4		CSTR 5		CSTR 6		CSTR 7		CSTR 8	
	A	B	A	B	A	B	A	B	A	B	A	B
Oscillatoria subbrevis	x	x	x	x	x	x	x	x	x	x	x	x
anguina		x	x	x	x	x		x		x	x	
limnetica	x	x	x		x	x	x	x	x	x	x	x
geminata	x	x		x		x	x	x	x	x	x	x
formosa												x
Phormidium interruptum	x	x	x	x	x	x	x					x
subfuscum		x	x	x			x		x		x	
Lyngbya subtilis	x	x	x	x	x	x	x	x	x	x	x	x
Chroococcus minimus		x			x	x	x	x		x	x	
dispersus	x			x			x				x	
Aphanothece nidulans	x					x	x	x	x	x	x	x
saxicola							x				x	
Aphanocapsa elachista	x			x	x			x		x		x
Microcystis incerta	x	x	x	x	x	x	x	x	x		x	x
Scenedesmus denticulatus		x		x		x		x		x	x	
dimorphus	x	x		x		x		x	x	x	x	x
obliquus				x		x		x		x	x	
bijuga	x	x		x		x	x		x	x	x	x
bernardii												x
abundans		x								x		x
quadricauda	x	x										
serratus												x
Coelastrum microporum	x	x		x				x			x	x
Chlamydomonas globosa	x	x	x	x	x	x	x	x	x	x	x	
pseudopertyii	x	x	x	x	x			x			x	
Cosmarium reinschii							x		x			x
meneghinii										x	x	x
sp.									x	x	x	
Staurastrum breviaculeatum	x	x	x	x	x	x	x		x		x	
Ankistrodesmus falcatus						x	x	x	x	x		
Tetraedron minimum										x		x
caudatum						x						
Spirogyra sp.			x									
Stigeoclonium sp.	x	x	x	x	x	x	x	x	x	x	x	x
Trachelomonas varians												x
Eutreptia viridis	x											
Chroomonas nordstedtii					x			x		x	x	
Nitzschia palea	x	x	x	x	x	x		x	x	x	x	
Gomphonema parvulum	x	x	x	x	x	x		x	x	x	x	
Pinnularia gibba	x											
Synedra rumpens										x		x

Table B-84. Genera of Suspended Algae Identified During Experiment 1.

- Division Chlorophyta
  - Order Volvocales
    - Chlamydomonas
    - Chlorogonium
  - Order Chlorococcales
    - Chlorella
    - Ankistrodesmus
    - Scenedesmus
    - Chlorococcum
    - Selenastrum
    - Tetraedron
  - Order Chaetophorales
    - Stigeoclonium
  - Order Zygnematales
    - Cosmarium
    - Penium
    - Mougeotia
    - Staurastrum
    - Closterium
    - Gonatozygon
    - Spirogyra
  - Order Oedogoniales
    - Oedogonium

- Division Cyanophyta
  - Order Chroococcales
    - Chroococcus
    - Microcystis
    - Merismopedia
  - Order Oscillatoriales
    - Oscillatoria
    - Lyngbya

- Division Chrysophyta
  - Class Bacillariophyceae
    - Order Naviculales
      - Navicula
      - Gomphonema
      - Cymbella
    - Order Nitzschiales
      - Nitzschia
    - Order Fragilariales
      - Synedra
    - Order Achnanthales
      - Achnanthes
  - Class Xanthophyceae
    - Order Tribonematales
      - Tribonema

Table B-85. Genera of Aufwuchs Algae Identified During Experiment 1.

- Division Chlorophyta
  - Order Volvocales
    - Chlamydomonas
    - Chlorogonium
    - Pandorina
  - Order Chlorococcales
    - Ankistrodesmus
    - Chlorella
    - Selenastrum
    - Scenedesmus
    - Tetraedron
    - Characium
    - Chlorococcum
  - Order Chaetophorales
    - Stigeoclonium
  - Order Oedogoniales
    - Oedogonium
  - Order Zygnematales
    - Closterium
    - Cosmarium
    - Penium
    - Staurastrum
    - Gonatozygon
    - Spirogyra
    - Mougeotia

- Division Cyanophyta
  - Order Chroococcales
    - Chroococcus
    - Microcystis
    - Synechococcus
    - Merismopedia
  - Order Oscillatoriales
    - Oscillatoria
    - Lyngbya

- Division Chrysophyta
  - Class Bacillariophyceae
    - Order Naviculales
      - Navicula
      - Cymbella
      - Gomphonema
    - Order Nitzschiales
      - Nitzschia
    - Order Fragilariales
      - Fragilaria
      - Synedra
    - Order Achnanthales
      - Achnanthes
  - Class Xanthophyceae
    - Order Tribonematales
      - Tribonema

Table B-86. Genera of Suspended Algae Identified During Experiment 2.

Division Chlorophyta

- Order Volvocales
  - Chlamydomonas
- Order Chlorococcales
  - Ankistrodesmus
  - Chlorella
  - Scenedesmus
  - Chlorococcum
- Order Chaetophorales
  - Stigeoclonium
- Order Zygnematales
  - Cosmarium
  - Penium
  - Staurastrum
  - Spirogyra

Division Cyanophyta

- Order Chroococcales
  - Chroococcus
- Order Oscillatoriales
  - Oscillatoria
  - Lyngbya
  - Phormidium
  - Spirulina

Division Chrysophyta

- Class Bacillariophyceae
  - Order Naviculales
    - Navicula
    - Gomphonema
  - Order Nitzschiales
    - Nitzschia
  - Order Fragilariales
    - Synedra
  - Order Achnanthales
    - Achnanthes

Division Cryptophyta

- Order Cryptomonadales
  - Chroomonas

Table B-87. Genera of Aufwuchs Algae Identified Experiment 2.

- Division Chlorophyta
  - Order Volvocales
    - Chlamydomonas
  - Order Chlorococcales
    - Ankistrodesmus
    - Scenedesmus
    - Chlorococcum
    - Pediastrum
  - Order Chaetophorales
    - Stigeoclonium
  - Order Zygnematales
    - Cosmarium
    - Staurastrum
    - Spirogyra

- Division Cyanophyta
  - Order Chroococcales
    - Chroococcus
    - Microcystis
  - Order Oscillatoriales
    - Oscillatoria
    - Lyngbya
    - Phormidium

- Division Chrysophyta
  - Class Bacillariophyceae
    - Order Naviculales
      - Navicula
      - Cymbella
      - Gomphonema
    - Order Nitzschiales
      - Nitzschia
    - Order Fragilariales
      - Synedra
    - Order Achnanthales
      - Achnanthes

APPENDIX C

RANK ORDERING OF RATE PROCESSES AFFECTING METHYL PARATHION DISAPPEARANCE

Microbial Transformation	1.31×10^{-2}/hr
Hydrolysis	3.51×10^{-3}/hr
Photolysis	7.9×10^{-4}/hr
Volatilization	6.61×10^{-7}/hr